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THE SURGERY, SURGICAL PATHOLOGY

AND

SURGICAL ANATOMY

OF THE

FEMALE PELVIC ORGANS

In a Series of Plates taken from Nature

WITH

COMMENTARIES, NOTES, AND CASES

BY

HENRY SAVAGE, M.D., LOND.

Fellow of the Royal College of Surgeons of England, one of the Consulting Medical Officers of the Samaritan Hospital for Women

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THIRD EDITION

REVISED AND GREATLY EXTENDED

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32 PLATES AND 22 WOOD ENGRAVINGS, WITH SPECIAL ILLUSTRATIONS OF THE OPERATIONS ON VESICO-VAGINAL FISTULA, OVARIOTOMY, AND PERINEAL OPERATIONS

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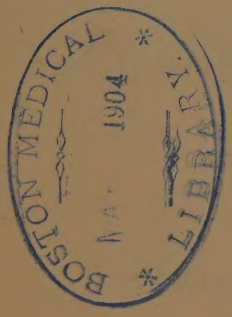

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TO

SIR WILLIAM FERGUSSON, Bart.

FOR MORE THAN TWENTY YEARS MY COLLEAGUE AT THE SAMARITAN HOSPITAL,

WITH EVERY SENTIMENT OF ESTEEM AND REGARD.

THE SURGERY, SURGICAL PATHOLOGY

AND

SURGICAL ANATOMY

OF THE

FEMALE PELVIC ORGANS

INTRODUCTION TO THE THIRD EDITION.

This Edition has been carefully revised throughout, and thirty-six wood engravings added. The plates remain unchanged; they are, as they were before, illustrations of the subject as faithful as I can make them. Plate XXIX., omitted in the second edition, has been reproduced.

The wood engravings are taken from numerous sources, those which best corresponded with my own investigations being selected. The substitution of similar figures I felt would be unfair to the original authorities.

I have attempted a classification of neoplasms incidental to the uterine system, on the basis of the pathological histology of the day, omitting questions purely speculative, not going beyond what I have been able in a great measure to observe and confirm.

Connective tissue, so called, soft and hard, is the true skeleton of all tissues. It is the same with all neoplasms; it is in the correlations of normal connective-tissue elements that abnormality entirely consists.

The variations of these correlations in neoplasms, not simply hypertrophic, are infinite; no classification, not even Virchow's, would include half of them.

Cancer stands out by itself (atypical, Waldeyer), and, in truth, is not a neoplasm. Cancer appears to me to be *cell necrosis*. Cancer epitheliums are dead cells; when they are in a dry state—certain forms of cancroid—or where they come away as they die,—the surface cancers (Billroth) and cancerous rodent ulcers,—cancer is comparatively innocuous. In active cancer the dead cells accumulating within the connective-tissue framework (which loses its branched cells) cause it to become vascular and permeated, together with the tissues in the immediate neighborhood, with leucocytes—cancer infiltration, wrongly called—usually washed out in cancer preparations (Pl. XII.). The "cancer-juice" is a solution of dead cells.

The question of malignancy is not to be determined histologically. Neoplasms, under the vague term Sarcoma, identical in structure, may be malignant in one case and not in another. In judging, there must be taken into account the possibility that tissues elsewhere may be synchronously saturated with dead epitheliums, or affected by sarcomatous changes, and these may obviously contribute the greatest share in the fatality. The suffering is entirely due to reparative vital reactions, generally abortive, tending to throw off the dead parts.

Amongst Ovarian Neocysts those called endogenous are the most remarkable; compare the Figs. (page 37) of Ovum and of Giant-cell vacuolation, the latter copied from Creighton; also the Figs. (page 68) from preparations made by my colleague, Mr. Thornton.

A summary of my impressions in regard to Ovarian Gastrotomy will be found in page 125; they are the results of experience founded on my prolonged co-operation with Mr. Wells, as his assistant, as well as colleague.

I have made room for very much new matter by withdrawing inferences which are self-evident, or must occur to the mind on reflection: such as the alar mesentery, being but partially under the control of the lateral ligaments, permits considerable displacement of the ovary and Fallopian tube; the possibility that these, as well as the small intestines, may be the contents of vaginal, or even rectal hernial prolapses; any part of the connective-tissue system may be the seat of neocysts, therefore the ovarian need not be follicular; the same inference applies to the formation of cysts near to, but not of, the ovary, which therefore also need not be parovarian. The danger of tapping uterine fibro-cysts, with thick, uncollapsing walls. The danger of the attempt to enucleate non-ostrakoid (unshelled) uterine fibroids. The impossibility of any direct communications between the uterus and placenta by means of large veins—no sinus system, in fact; the uterine veins are the interspaces in the erectile middle layer of the uterus, lined by venous endothelium; as it is by their contour, and not by their ends, that these venous channels approach the decidua, uterine hæmorrhage (flooding) means rupture of the uterus. The almost certain fatality of complete amputation of the uterus, Pl. XI. Fig. 2. The pelvic attachments of the lateral ligaments being at the sacro-iliac joints, the uterus is slung forward, and so, to a certain extent, naturally anteverted. These ligaments have to contribute to the support of the small intestines, explaining the relief derived from well-adjusted abdominal supports. The vital antagonism between the uterine body and cervix, and the effect of artificial dilatation of the latter in in-

ducing the contraction of the former. The likelihood of attributing to the cervix affections due to tissue-changes within the uterine body, so throwing away years of local treatment exclusively adapted to the former, &c. The judgment, tutored too much, is taken by surprise, and, incapable of independent action, is baffled over dilemmas which cannot be anticipated.

Uterine sympathies find a better exposition in those later discoveries, the nerve endings more especially, which go to show that the uterine system possesses abundance of nerves of special sense hitherto unsuspected (Pls. XVI. and XVII. text).

The cases have been selected in abstract from records more extended; they must be taken as inferential guides to surgical practice under analogous circumstances.

The diagrams which end the work are intended to illustrate most of the uterine displacements which can possibly happen. Many of such displacements have been recorded.

PLATE I.

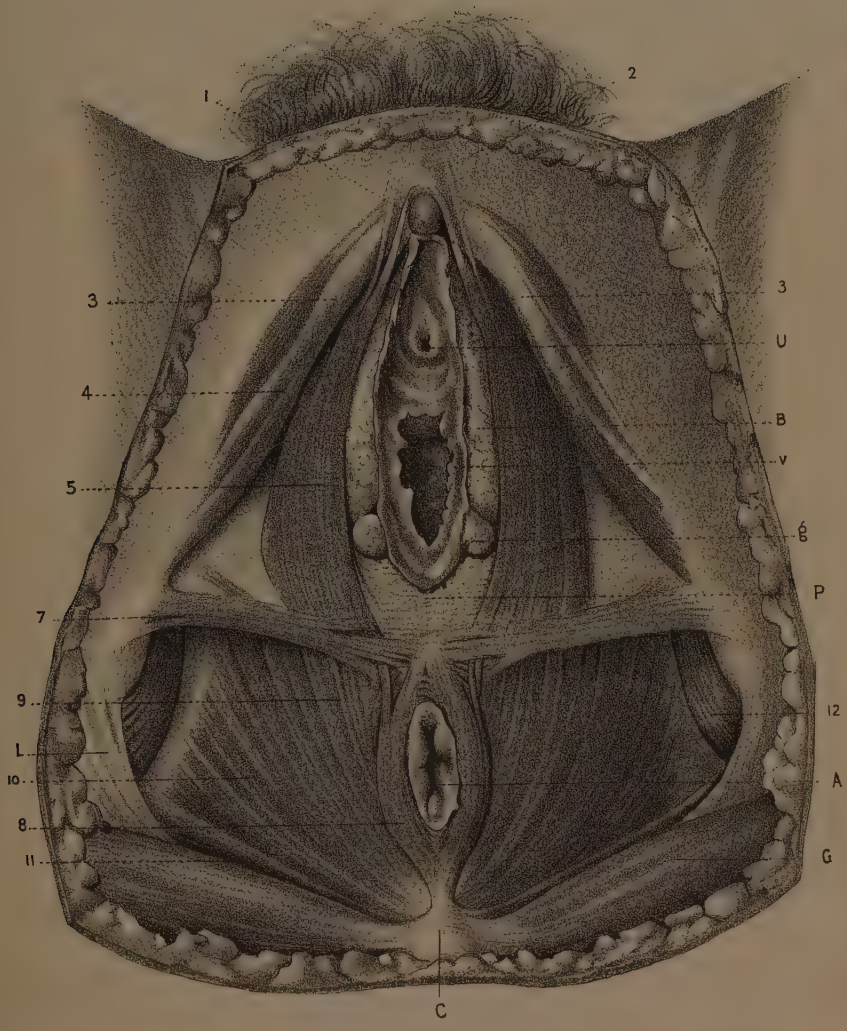

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PLATE I.

MUSCLES OF THE FEMALE PERINEUM.

Superficial Muscles of the Anterior and Posterior Perineal Spaces. A few Muscular Striæ, chiefly cutaneous, covering the Perineal Body (P), *together with the Mucous covering at the Inferior Vulvar Commissure, removed.*

A, *Anus*, surrounded by the superficial sphincter muscle: inferior circular fibres of the rectum (deep sphincter) apparent behind its anterior margin. B, *Bulb of vagina* (corpus spongiosum urethræ), covered for the most part by the bulbo-cavernosus muscle, one of the deep attachments of which it receives. C, *Coccyx*, two last bones, giving attachment by the tip, to the superficial sphincter, by the sides, to the pubo- and obturato-coccygeus muscles, and anterior portion of the ischio-coccygeus muscle, and by the posterior surface, to the inferior fibres of the gluteus maximus muscle. L, *Larger sacro-sciatic ligament*, its attachment to the tuber of the ischium. P, *Perineal body*. Midway between the posterior vulvar commissure and the anus those perineal structures which meet there become, as it were, fused together by a great accession of elastic tissue, without altogether losing their identity; the result is a body or structure at once highly elastic and resistent. The integrity of the female perineum depends entirely on this perineal body; it is, besides, a centre of attachment for—the *ligamentum ischio-perinei* (Pl. IV.) formed by the union of the superficial perineal fascia with the inferior border of the perineal septum; the *Superficial perineal transverse muscle;* and the anterior end of the *Superficial sphincter muscle*, its deep and cutaneous terminations. The median fibres, at their origin, of the *Bulbo-cavernosus muscle;* the *Perineal septum* below the vagina; the inner (median) fibres of the *Ischio-coccygeus* muscle; and a few muscular striæ, chiefly cutaneous, interchanging between the central ends of the superficial sphincter; superficial transverse; and bulbo-cavernosus muscles. V, *Vaginal aperture;* and U, *Orifice of urethra*, the urethro-vaginal tubercle—commencement of urethro-vaginal septum, intervening (Pl. II.). G, *Vulvo-vaginal gland*, exceedingly variable in size and shape (occasionally as large as an

almond); it lies immediately below the bulb, in front of, and near the lower margin of the perineal septum; its duct opens in the vestibule, close to, but not within the vaginal orifice. This gland in the female is not covered, as in the male, by the anterior aponeurosis of the septum.

1, *Clitoris.* 2, Its *Suspensory ligament* and muscular striæ from the bulbo-cavernosus muscle. 3, *Crura clitoridis.* 4, *Erector clitoridis muscle*, arising from the ramus of the pubis and that of the ischium—the anterior margins: inserted, by two tendinous expansions, one above where the crura joins to form the clitoris, one in front somewhat below. 5, *Bulbo-cavernosus muscle*, arises below, from the perineal body, and from a considerable portion of the anterior aponeurosis of the perineal septum; inserted into the crus of the same side, by a thin slip (occasionally a broader expansion) above, and in front of, the adjoining erector muscle; its outer portion winds inwards under the latter, to be inserted into the upper part of the bulb near its isthmus—*i. e.*, immediately below the urethra. Of its median fibres, some, apparently derived from the sphincter, pass upwards to the clitoris, and on to the pubis, to be lost in the superficial fascia; some form a delicate muscular arch over the body of the clitoris. 7, *Superficial transverse muscle* of the perineum; arises from the ramus of the ischium, in front of the tuberosity, and from the anterior aponeurosis of the perineal septum; inserted into the perineal body and skin of the perineum in front of the anus. 8, *Sphincter ani externus*, deep portion, arises from the tip of the coccyx inserted into the perineal body; the superficial portion (removed) is entirely cutaneous. 9, *Pubo-coccygeus muscle* (Pl. XV., Fig. 1)—portion below the perineal septum; its fibres, in direction, resemble the superficial sphincter, between which and the deep sphincter (lower circular fibres of the rectum) its inner edge is interposed. The longitudinal fibres (outer coat) of the rectum, at their termination, intermingle with this part of the muscle. The fibres of the outer margin of the pubo-coccygeus muscle are inserted into the two last bones of the coccyx; the intermediate fibres join those from the opposite side, between the coccyx and rectum, forming loops constituting a semicircular addition to the deep sphincter. 10, *Obturato-coccygeus muscle*, arises from the ilio-pubic line of junction between the obturator and recto-vesical fascia; inserted into the side of last two bones of the coccyx. This muscle has no rectal relations. 11, *Ischio-coccygeus muscle*, its anterior border (Pl. XV., Fig. 1). 12, *Obturator externus muscle*, its fibres collected together making their way through the smaller sacro-sciatic foramen, winding round the ischiatic notch (Pl. X., Fig. 1).

Fig. 1.

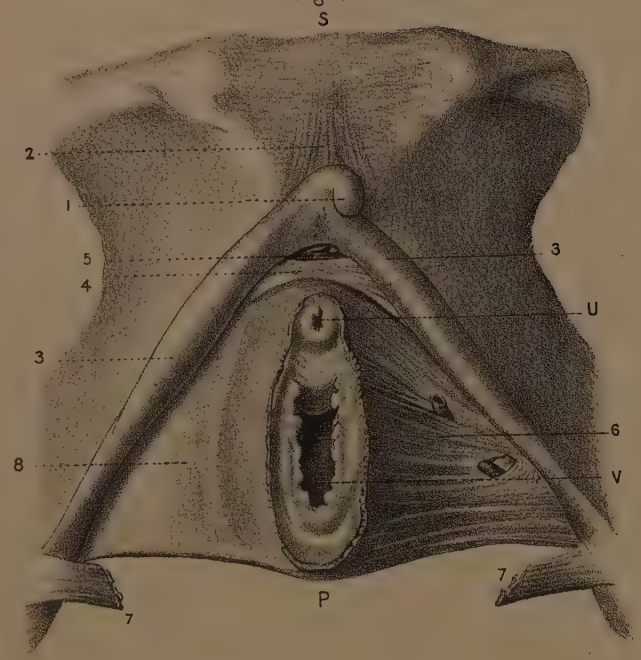

Fig. 2.

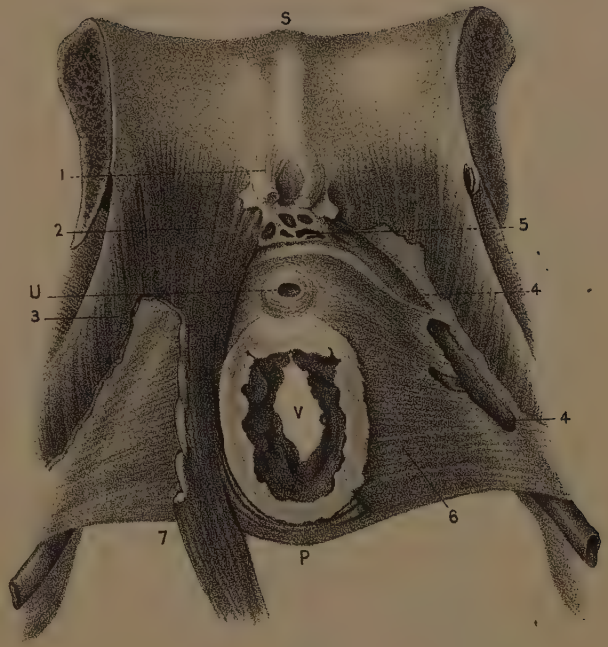

PLATE II.

Fig. 1.

Perineal Septum—Front View.

1, *Clitoris*—a double line of venous apertures on its under surface (Pl. VI., Fig. 3). 2, *Suspensory ligament.* 3, *Crura clitoridis.* 4, *Sub-pubic ligament;* completing the perineal septum. 5, *Dorsal vein* of the clitoris—its farther truncated end cut through, where it joins the urethro-pubic venous plexus. It enters the pelvis between the ligament and pubic arch, immediately dividing into right and left branches. 6, *Perineal septum;* the anterior aponeurosis removed on left side. The septum consists of a front and back aponeurosis and intervening muscular fibres (deep transverse muscle). The two aponeuroses are essential components of the structure. It is attached externally to the greater part of the pubo-ischiatic osseous margin, behind the crura clitoridis, from the attachment of the sub-pubic ligament in front, to a point below, where the tuberosity of ischium begins. The upper fibres (oblique) join those from the opposite side so as to enclose the urethra (Guthrie's muscle). The lower fibres (transverse) meet each other below the vagina. The remainder of the septum resembles, in the mixed arrangement of its fibres and their intimate relations to the aponeuroses, the coats of the vagina, of which indeed the septum altogether may be considered the continuation, with upper oblique and lower transverse fibres superadded. 8, *Anterior aponeurosis*, the shaded line, left side, indicating the surface attachment of the bulbo-cavernosus muscle. 7, Outer attachments of the *superficial transverse muscle*. *P*, Site of perineal body.

Fig. 2.

Perineal Septum—Posterior View, together with the Pelvic Attachments of Pubo- and Obturato-coccygeus Muscle (levator ani).

S, *Pubic symphysis*, its inner surface. U, *Urethra.* V, Section of the *Vagina*, showing a prostatic structure between the two in front of the vesical trigonum; depressions, often containing minute concretions

similar to prostatic concretions in the male, exist in the corresponding portion of the female urethra.

1, Pubic attachment of the external or longitudinal muscular coat of the bladder, the remainder being attached, on each side, to an arched process of the aponeurosis covering the pubo-coccygeus muscle, and to the inner aponeurosis of the septum. 2, Pubic attachments of the *Pubo-coccygeus* muscle: a series of distinct muscular bundles separated by strong cellular tissue. 3, Line of attachment of the *Obturato-coccygeus muscle*,

Perineal Area, three-quarter aspect.

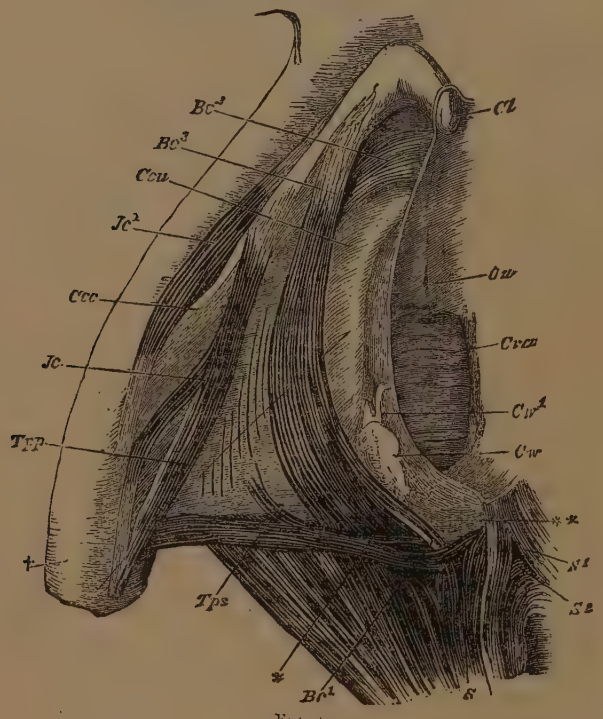

Fig. 1.

Cl, Clitoris. *Ccu—Ccc*, Corpus cavernosum clitoridis, and Bulb of Vagina, enclosed in its sheath. *Bc*¹, muscular striæ from S, Sphincter ani. *Bc*², muscular slip of M. Bulb. cavernosus, terminating under the mucous membrane of the urethral vestibule. *Bc*³, a slip inserted into the under and forepart of the clitoris. A third insertion (*Bc*²) has its expanded termination in the back part of the bulb *Ccu*. *Jc—Jc*¹, Erector clitoridis. *Tpp*, Deep transverse muscle enclosed between the middle and deep fasciæ of the perineal septum. *Tps*, Superficial transverse muscle *S*, Sphincter ani. *S*¹, Cutaneous end of superficial sphincter muscle. *S*², Orbicular fibres of the same. *Cw*, Cowper's gland. *Cw*¹, Duct of Cowper's gland. *Cva*, Vaginal orifice. *Ou*, Orifice of the urethra. *, Organic fibres. **, The same covering and adhering to the subcutaneous fascia forming a part of the perineal body. Plates III., IV., X.

also in bundles, but less obviously separable. 4, *Pudic vein* in a special channel between the aponeuroses of the septum. It is accompanied by the pudic artery, but the vein, unlike the artery, is subject to compression by some of the muscular fibres of the septum, which separate the two vessels by passing between them. Truncated branches of each vessel seen in Fig. 2. 5, *Urethro-pubal venous plexus* communicating with the pudic

vein. 6, Posterior face of the septum. 7, Median portion of the Pubo-coccygeus, some of its inner fibres passing inwards under the vagina, where, with the lower edge of the septum, they are comprehended in the perineal body.

The urethro-vaginal septum in which the urethra is, as it were, embedded, as well as the muscular structure surrounding both canals, is pervaded by an erectile system of veins which collocate specially around the urethra.

Horizontal Section through the Urethra, Vagina, and Rectum, above the Vaginal Aperture and the Superficial Sphincter of the Anus.

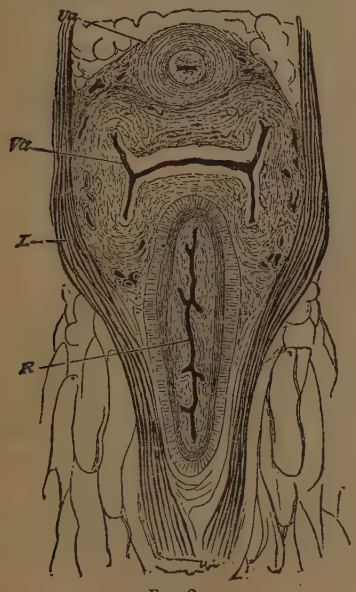

FIG. 2.

Ur, Urethra. *Va*, Vagina. *L*, Levator ani, the pubo-coccygeal portion. *R*, Rectum. The anterior and posterior vaginal columns come together throughout. The horizontal line marks the cut ends of the columns. The side lines of approximation are due to the lateral action of the Levator ani. Pls. I., X., XI., XV.

The sebaceous glands of the labium, where hairs are, have the ordinary relations with the hair bulbs; elsewhere they are independent glands. They are more or less numerous—1, On the inner surfaces of the labia; 2, On both sides of the nymphæ; 3, The outer surface of the prepuce; 4, The inner surface of the navicula. They are specially abundant on the inner surface of the nymphæ.

The hymen is a prolongation of the double membranous fold composing the margin of the vaginal orifice. The vaginal vestibule is bounded by the nymphæ and navicula. The cornua of the hymen sometimes extend upwards beyond the urethral orifice, or joining together, leave a small, round, nearly central aperture, or there is no aperture (imperforate hymen). The hymen not infrequently contains muscular fibres.

The *Carunculæ myrtiformes*, most irregular in form and size when they exist, are situated immediately behind the hymen. They are vascular membranous processes, independent of the hymen, and not remnants resulting from its laceration.

The nymphæ at their vulvar attachments cover the inner edges of the bulbs and their urethral venous processes; their complete extirpation would denude so much of the latter as to leave a troublesome wound, resulting at best in considerable deformity in that part of the vulva.

In amputation of the vulva, it is obviously desirable to leave untouched, if possible, the under layer of superficial perineal fascia (Pl. III.).

The *Perineal body* is a structure peculiar to the female (welches zu beiden Seiten der hinteren Commissur der Labia, einen harten ungenau begrenzten, aus Bindegewebs und elastischen Fasern, und vielfach durchkreuzten organischen muskelbündeln gewebten, von starken Gefässen

durchzogenen *Körper* bildet, in welchem die verschiedenen animalischen Muskeln der Perineal-gegend auf einander treffen und zum theil in einander Ubergehen. Henle). (Je veux parler de cette sorte de tissu fibro-élastique mélange de vaisseaux, sur la nature duquel on n'est pas encore fixé. Richet), speaking of that and the *vaginal ring* generally. A design can scarcely do more than indicate the situation and relations of this body. It has always appeared to me as described in the text; it is covered by vestibular mucous membrane at the posterior vulvar commissure and muscular striæ prolonged anteriorly from the superficial sphincter ani, which go partly to the skin, partly to the compressor bulbi muscles. A figure of 8 interchange of fibres I have never been able to make out.

The vascularity of the perineal body (starken Gefässen) mélange de vaisseaux) is far from remarkable at the middle line. A common form of

The Vulva and Glands of the Labium.

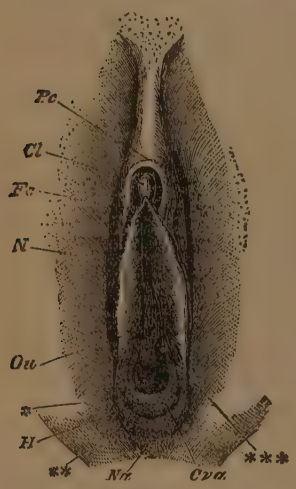

FIG. 3.

FIG. 4.

Pc, Prepuce of *Cl*, Clitoris. *Fc*, Frænum. *N*, Nymphæ. *Ou*, Orifice of Urethra. *H*, Hymen. *Na*, Navicula, apparent continuation of the fold composing the nymphæ. *Cva*. Anterior column of the Vagina (Pl. X., Fig. 2). *, Orifice of Cowper's Gland. **, Vaginal Vestibule. ***, Glandular Lacunæ near the Urethral Orifice (Pl. XIX., Fig. 3).

vaginismus is due to the excessively unyielding character of this structure; this I have as a rule effectually relieved by a median perpendicular incision three parts through it, with scarcely any loss of blood.

The deep layer of the superficial perineal fascia, where it covers, and indeed encloses the superficial transverse perineal muscles, forms two real ligamentous transverse bands (the ischio-perineal ligaments). At their central terminations they help, with the other perineal structures, to form the perineal body: their influence in parturition (*vide* Pl. XI., Fig. 1).

The success of operations for the closure of perineal lacerations is obviously not promoted by the division of the superficial anal sphincter (*vide* Pls. XXII., XXIII).

The pubo- and obturato-coccygeal muscles (levator ani) effect the reverse of that usually ascribed to them; they draw forwards and assist in closing the rectum.

The *Constrictor vaginæ muscle* is not the bulbo-cavernous muscle (compressor bulbi). Constriction of the *Vaginal ring* is produced by the pubo-coccygeus muscle (Fig. 3). This muscle, after macerating the piece in carbolic water for a short time, can be lifted away from the septum, which is then seen to be the vagina continued on to its osseous attachments.

The completion of the last stage of parturition is possible only through the adequate dilatation or rupture of the perineal body. The perineal septum is elastic, like the remainder of the vagina, but the resistance of the bilateral ligamentous structure, resulting from the union of the perineal aponeuroses along the lower edge of the septum, throws the strain almost entirely on the perineal body. Extension from before backwards, without destructive effect, could not take place were the attachments of the pubo- and obturato-coccygeus muscles as usually described. The fœtal head passes through a longitudinal rima bounded by two lines of parallel muscular fibres extending from the pubis to the coccyx. The length of these fibres, and their arrangement into bundles separable laterally, allows of a preliminary globular expansion over the presentation; but its final covering is solely the perineal body enormously distended and attenuated in proportion (*vide* Pl. XI., Fig. 1).

The muscular fibres of the perineal septum, like those belonging to the rest of the vagina, are for the most part organic.

The middle and posterior aponeuroses of the perineal septum afford abundant points of attachment to adjoining muscles—the former to the bulbo-cavernosus muscle and superficial transverse muscle of the perineum; the latter to the pubo-coccygeus muscle. It is impossible to dissect them away from the intervening muscular layer proper to the septum without risk of causing some misapprehension as to the real character of the latter.

The external muscular fibres (longitudinal) occupying the lower half only of the vagina, terminate in, and are intermixed with, the inner fibres of the pubo-coccygeus muscle, much as are the outer longitudinal fibres of the rectum with those of its inner sphincter muscle.

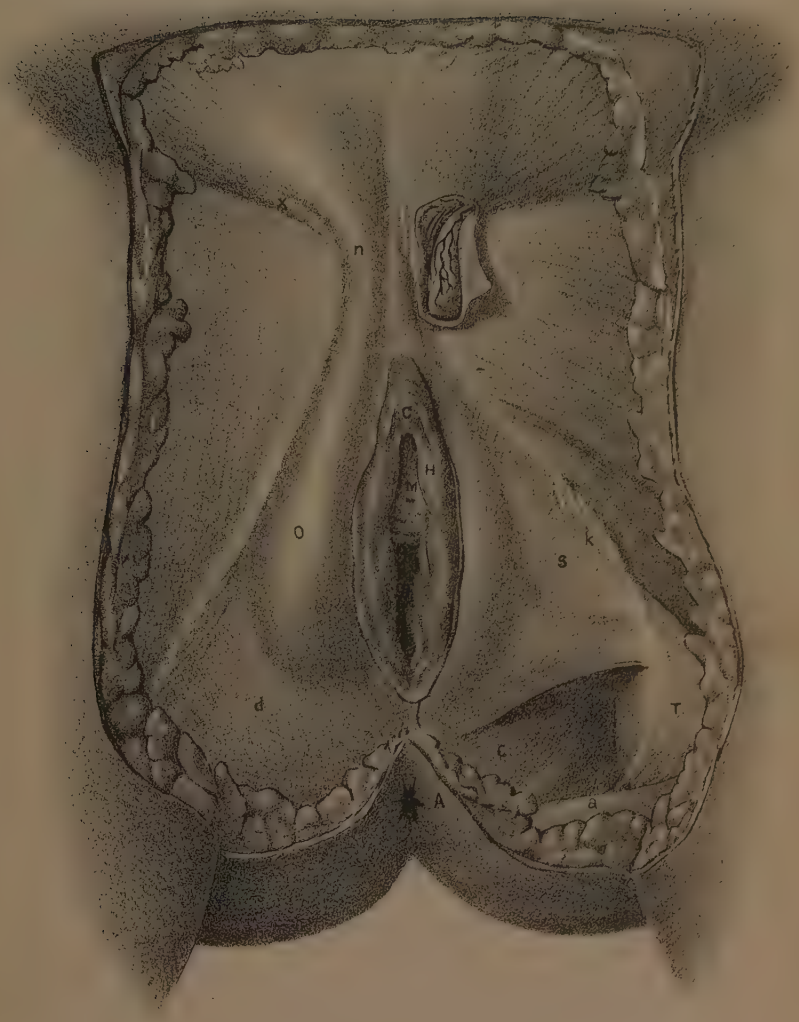
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PLATE III.

OUTER FASCIÆ AND APONEUROSES OF THE FEMALE PERINEUM.

Superficial Perineal Fascia—Anterior View.

The Subcutaneous fascia on the lower part of the abdomen is a double membranous layer—viz., an *upper one*, more or less loaded with fat; an *under one*, forming a resisting membranous investment. A covering of the same character occupies the perineal area: the upper or fatty layer is continuous, without interruption, with the same structure over the nates, thigh, and abdomen; the under one, however, in descending from the abdomen, is narrowed to the width of the pubis, whence it spreads out, in descending, so as to cover in the anterior perineal triangle down to its base—the lower border of the perineal septum. The abdominal portion is firmly adherent to Poupart's ligament; the perineal portion to the outer margins of the ischio-pubic rami, and to the lower margin of the septum; and the pubic portion, to the bone along a curved line indicating the origin of muscles belonging to the fore part of the thigh.

At the margins of the external inguinal ring, to which this under layer is also adherent, commences the *Pudendal sac;* its character is best conceived by imagining a protruding agent escaping at the ring, and forcing before it the opposing circular disk of this membrane in the form of a blind tubular prolongation as far as the posterior vulvar commissure. The neck of the sac (*n*) can be readily separated from the subjacent pubic portion of fascia, but the posterior wall of the sac itself (*O*) in the perineum is inseparable. At (*d*) the upper and under layers of the fascia come together, forming a single fatty membranous layer, which entirely fills up and renders uniform with the adjoining surfaces, that extensive and irregular fossa, the *Posterior perineal space* left between the conically projecting muscular floor of the pelvis, and the bony pelvis below its attachments, *a*, *c*, and Pl. IV., *a*, *b*, *c*, Figs. 1, 2.

The Pudendal sac contains generally, not always, more or less fatty tissue, which is continued upwards through the neck, where it receives the terminal fibres of the round ligament of the uterus. The two sacs,

with their cutaneous coverings, present themselves at the vulva as the *Labia majora* (Pl. XVII., Fig. 2). Usually the lax mucous tissue between the double tegumentary fold composing the Labium betray but little evidence of a sac, but in cases where this tissue is transformed into fatty tissue, or in case of labial hernia, a perfect sac with membranous walls shows itself; such as first described by Broca.

Hernias through the inguinal ring would evidently make their way in descending into the pudendal sac through its neck, presenting as it does so many analogies to the scrotum, yet no dartoic elements have as yet been clearly made out in any of its coverings.

A, *Anus*—v, *Vaginal aperture.* M, *Urethral meatus* and *Urethro-vaginal tubercle.* H, *Nymphæ.* C, *Clitoris* and its suspensory ligament —a special process of the under layer of the superficial fascia: it is attached to the pubic symphysis, where it separates the two cervical prolongations of the pudendal sac. T, *Tuberosity of the ischium.* c, *Obturato-coccygeus muscle.* *a*, Anterior edge of the *Gluteus maximus muscle*, attached to the larger sacro-sciatic ligament. The under layer of the superficial fascia (*s*) strongly attached to the ischio-pubi rami (at *k*), to the lower edge of the perineal septum, and to vaginal ring. The *Ischio-rectal fossa* between *T*, *c*, and *a*, extending upwards behind the perineal septum as high as the pubic attachments of the pubo-coccygeal muscle.

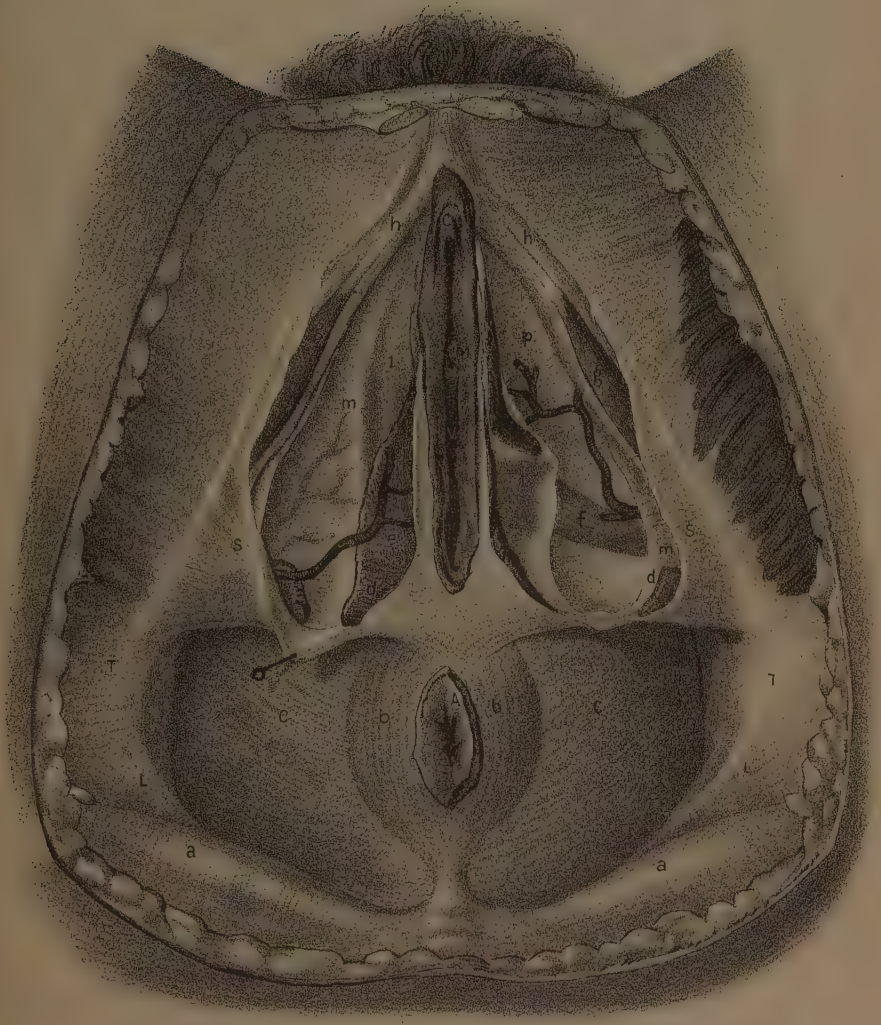
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PLATE IV.

Deeper Fasciæ of the Female Perineum. Nates elevated to show, at one view, both Perineal Spaces.

A, *Gluteus maximus* muscle, anterior border attached to L, *Large. sacro-sciatic ligament.* T, *Tuber Ischii.* c, *Pubo-* and *Obturato-coccygeal* muscles. A, *Anus,* surrounded by b, *Sphincter externus.* d e, *Superficial transverse* and *bulbo-cavernosus* muscles, crossed by a branch of pudic vein; both muscles partially removed to expose anterior aponeuroses of the perineal septum (*m*), and membranous investment of the bulb, *l. g,* Anterior (lower) portion of *Erector clitoridis* muscle. *h,* Aponeurotic expansion of the upper portion on the crus. C, *Clitoris* and its musculo-membranous covering. M, *Urethral meatus;* v, *Vaginal aperture; f,* additional muscular fibres belonging to the septum, the remainder scraped away to expose its posterior aponeurosis. The *Bulb* (*l*) on the left side, partially cut away to show its membranous sheath; the portion still attached is seen ascending to the urethral vestibule, where it unites by a cross *isthmus* of the same structure with the bulb of the other side.

The *Ischio-perineal ligament* is an extremely resisting aponeurotic band, attached by its outer ends to the rami of the ischium, somewhat in front of their tuberosities; they are confounded in the structure of the perineal body. This structure is the resultant of the union of the two layers of the superficial fascia with the lower border of the perineal septum: the cutaneous and membranous layers are here closely adherent. Many of the superficial terminal fibres of the muscles which meet at the ano-vulvar portion of the perineum are skin fibres (Pl. I.).

Perineal abscess occurs in two forms: 1, Diffuse abscess in the superficial perineal fascia, spreading rapidly in all directions. When commencing in the posterior perineal space it tends to make its way forwards and upwards to the extent of the ischio-rectal fossa. When the suppuration results in the complete destruction of the adipose fascia in the posterior or ano-perineal space, the anus and anal muscles are left denuded, the former hanging in the centre like the clapper of a bell (Richet). 2, Cir-

cumscribed abscess of the ano-vulvar gland (Pl. VI., Fig. 1), projecting as an oval tumefaction on one or both sides of the vaginal vestibule.

Adipose perineal growths occur as circumscribed tumors, and as irregular enlargements, sometimes enormous, of the pudendum. The former are metaplasias of the mucous tissue of the pudendal sac; the latter of the upper or fatty layer of the superficial perineal fascia. Abscess within the perineal septum has not been observed. Much confusion, in respect to the perineal, and indeed the fascia of any other region of the body, would be avoided by laying aside the idea of fascial processes; a false notion clinging to the usual anatomical descriptions of fascia. Every perineal organ has its special fascial investment, which is connected more or less closely with (not derived from) adjoining membranous investments or fasciæ, as the case may be. It would be impossible to remove either of the aponeuroses of the perineal septum without changing the character of the structure. The fascia of an organ is in fact a part of its structure, and is independent of, however much connected with, the fascial or aponeurotic coverings which serve to keep other organs in their places or bind them together.

A line corresponding with the ischio-perineal ligament divides the perineum into anterior and posterior spaces. It is obviously of practical importance to be well acquainted with the boundary lines of the perineum; these are readily made out by the finger, by which can then be traced, with tolerable precision, the situation of each of the constituents of this important region (Pls. V., VI.).

The mass of fatty tissue filling up the ischio-rectal fossa and posterior perineal space, is intersected in every direction by strong fibrous trabeculæ. *This fatty structure, peculiar to this situation, seems never subject to hypertrophic enlargement.*

PLATE v.

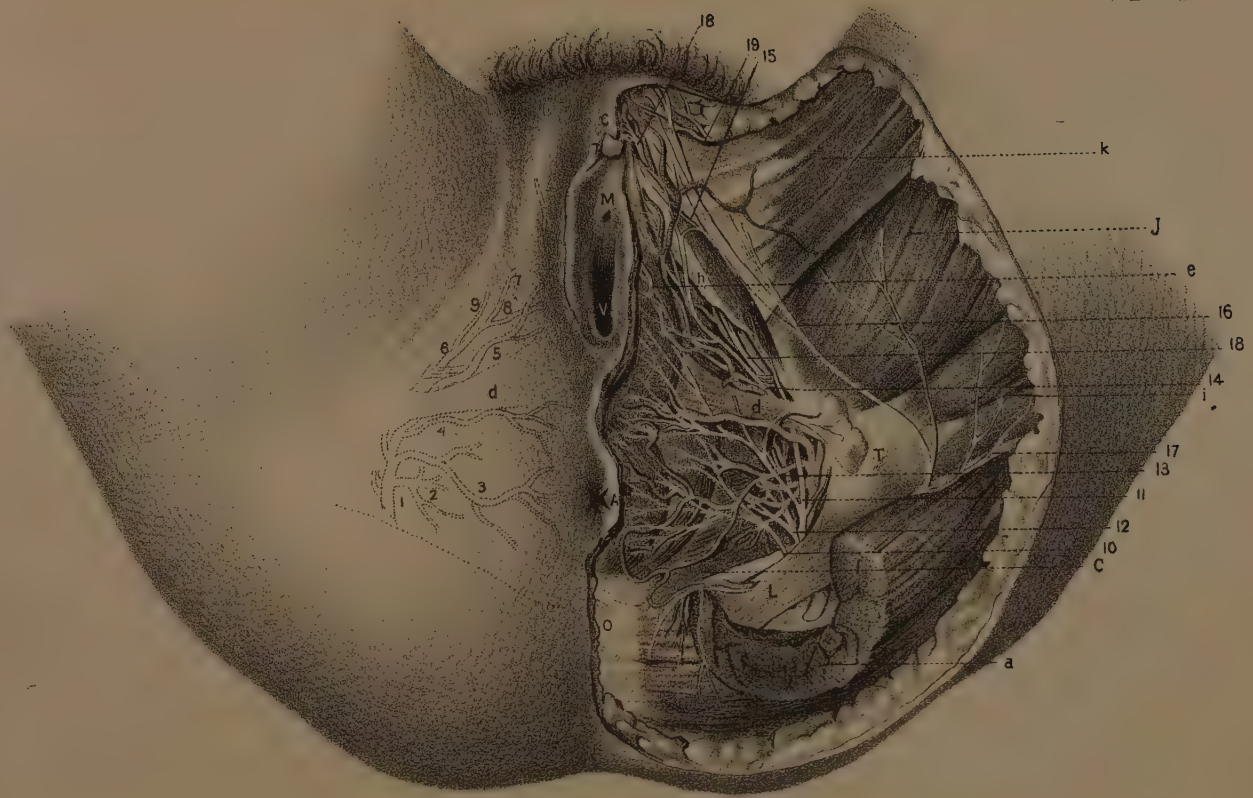

PLATE V.

ARTERIES AND NERVES OF THE FEMALE PERINEUM.

The *Pudic artery*, one of the primary branches of the anterior division of the internal iliac artery, descends by the side of the rectum in front of the pyriformis muscle and sacral nerves, to pass out at the larger sacro-sciatic foramen; then making a sharp turn (*L*) round the spine of the ischium, close to the attachment of the smaller sciatic ligament and ischio-coccygeus muscle, it enters the posterior perineal space. It now lies on the internal obturator muscle, enclosed with the pudic nerve in a canal formed for it by the obturator fascia, at least an inch above the tuber ischii (*T*), then coming forwards, keeping close to the bone, it enters another canal left between the aponeuroses of the perineal septum at their attachment to the ischio-pubic rami, to reach the under part of the crus clitoridis. *Branches:*—2, 3, *Inferior hæmorrhoidal.* 4, *Transverse perineal.* 5, *Superficial perineal* or vulvar artery, much larger than the corresponding branch on the male, ascends midway through the anterior perineal space immediately beneath the superficial fascia. 8, *Artery of the bulb.* 7, *Profunda branch* to the crus clitoridis. 9, *Dorsal artery* of the clitoris (*Vide* Pl. VIII.).

The *Pudic nerve* is derived from the lower part of the sacral plexus. It joins the pudic artery where the latter makes its turn to reach the posterior perineal space through the smaller sciatic foramen. *Branches:*—10, *Inferior hæmorrhoidal* to sphincter and lower part of rectum. 11, *Posterior superficial*, and 14, *Anterior superficial* branches to the vulva. 13, *Trunk of the nerve.* 12, *Posterior muscular.* 15, *Anastomotic;* with 16, the pudendal branch of the smaller sciatic (17) nerve. 18, 18, Continuation of the pudic nerve, which, after giving off branches to the crus and its muscle, ends by forming a *true nervous sheath* for the Clitoris. 19, *Outer terminal branch* of the ilio-inguinal nerve.

A, *Anus.* C, *Clitoris.* M, *Urinary meatus;* the urethro-vaginal tubercle below; the urethral vestibule above; between the orifice and the root of the clitoris. L, *Greater sacro-sciatic ligament.* V, *Vagina.* O, *Coccyx.* a, *Gluteus maximus*, lower border; a portion cut away to show where the pudic artery turns into the posterior perineal space. b, *Super-*

ficial sphincter. C, Anterior edge of *Ischio-coccygeus muscle* and subjacent smaller sciatic ligament. Still further forward, the lower fibres of the ischio- and obturato-coccygeus muscles. d, *Superficial transverse muscle.* e, *Bulbo-cavernosus muscle.* *f*, Slip of anterior aponeurosis of the perineal septum. *g*, Upper portion of the *Erector clitoridis muscle.* j, *Adductor magnus*, and k, *Gracilis muscles.* T, *Nerve fibrils* to fatty tegument.

The arterial supply of the perineum is derived from the pudic artery. As far forwards as the origin of the superficial transverse muscle this vessel is sheltered by a prolongation of the great sciatic ligament, more especially at the tuber ischii, where it is an inch above the bone; but its chief perineal branches are abundantly exposed to injury. The latter, tolerably regular in distribution, are most irregular as to their point of departure from the main trunk.

The same remarks apply to the pudic nerve and branches. Section of the pudic nerve is possible at the point marked 18, but not so elsewhere without serious injury to adjoining structures.

Complete ablation of the vulva involves numerous minor arteries; though comparatively small, many of them would require the ligature.

Ablation of the clitoris involves its two dorsal arteries, easily commanded by well sustained pressure. Small as this organ is compared with the penis, it has in proportion four or five times the nervous supply of the latter. The terminal filaments of the pudic nerve form a complete nervous sheath over the fibro-elastic outer coat (Pl. XVI.).

Surgical precautions in respect to the arteries of the region require but little comment. Incisions or wounds give trouble in proportion as they approach the outer perineal boundaries.

No vessel but the pudic trunk would, as a rule, require ligature to each of its divided ends. This vessel is accompanied by two large veins and the pudic nerve; bearing in mind its relations as above indicated. The operation is not one of difficulty.

Fig.3.

Fig.2.

Fig.1.

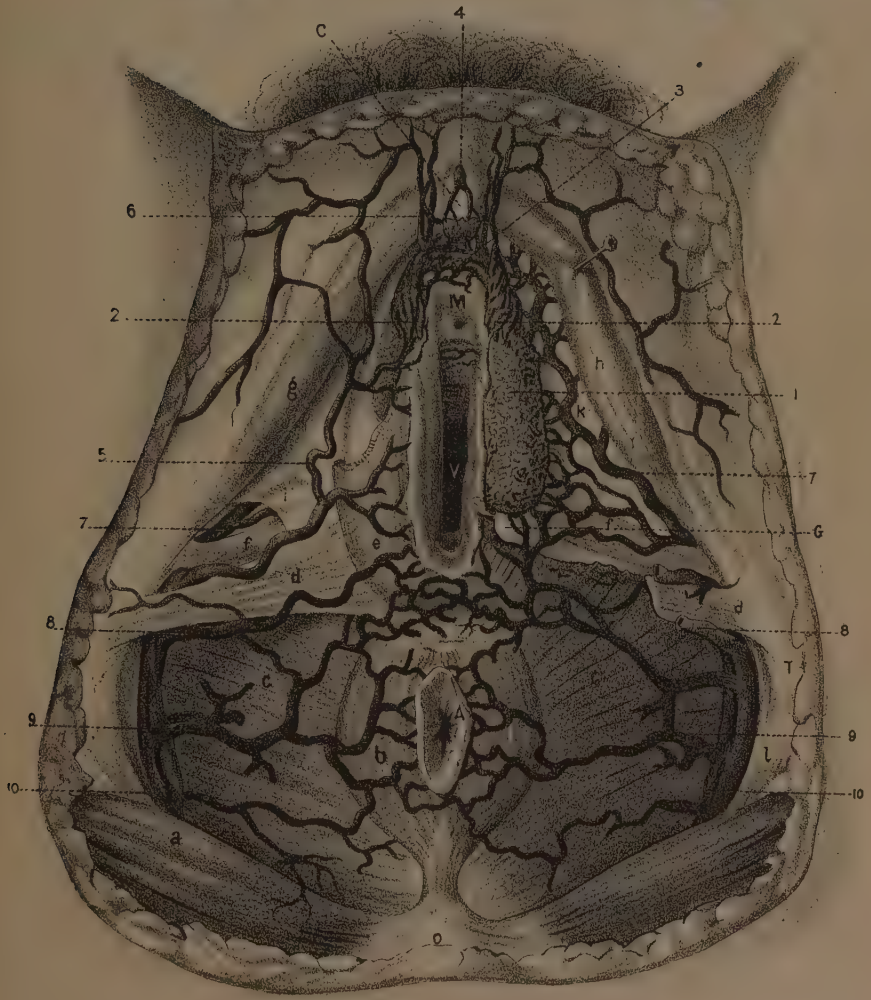

PLATE VI.

ERECTILE ORGANS AND VEINS OF THE FEMALE PERINEUM.

Fig. 1.

The Superficial Veins of the Perineum and Perineal portion of the Erectile Venous System in the Female.

The *Crura clitoridis ; h, g,* are two cylindrical erectile bodies of the cavernous order. They are nearly half an inch in diameter, and repose on the inner surface of the ramus of the pubis on each side, to which they adhere through the interposition of condensed cellular tissue. They extend from a point where the ramus of the pubis joins that of the ischium, to the fore part of the pubic symphyses; here they come together and adhere by juxtaposition, then making a sudden turn forwards become the corpus clitoridis.

The *Corpus Clitoridis* (*C.*), of variable length, consists of two lateral halves separated by a perforated septum, affording free vascular communication between the two sides. Thus composed, the corpus is no larger than a single crus; it terminates in a blunt end, which is tipped by a nervo-vascular rete remotely analogous to a glans. The clitoris and crura have for their outer covering a strong fibro-elastic albuginea, to which their erectile tension is due. The pudic nerve (Pl. V.) forms by its numerous subdivisions a nervous expansion lying on the albuginea of the corpus. The two terminal branches of the pudic arteries, one on each side of the dorsal vein, reach the dorsum of the clitoris through a space between the crura at their junction and the pubic arch, where they pierce the suspensory ligament. The dorsal vein takes the same course; it enters the pelvis between the arch and subpubic ligament (4). (Pl. XVI.)

The *Corpus cavernosum urethræ* (bulb of vagina) (1, 2, 3) is an oblong body, about an inch and a half long, and nearly half an inch thick at its broader or lower end. With its venous processes it extends from the root of the clitoris to the lower third of the vaginal orifice, where it corresponds to the vulvar attachments of the nymphæ—*i. e.*, each side of the

upper half or two-thirds of the vaginal aperture and sides of the urethral vestibule. It is enveloped in a fine membranous covering, and is covered for the most part by the bulbo-cavernosus muscle (Pl. I.). The bulb rests on the anterior aponeurosis of the perineal septum, to which it is firmly attached (Plate II., Fig. 1); at its lower end it is in contact with the vulvo-vaginal gland *G*, whence tapering upwards it ends in *communicating and vestibular* venous prolongations or plexures. 2, *Venous processes* analogous to the corpus spongiosum urethra in the male. 3, *Vestibular intercommunicating* branches or isthmus of the bulb. 5, *Superficial perineal and obturator veins*, receiving large communications from 3. 6, *Veins of communication* with superficial epigastric veins. 8, 9, 10, Pudic vein and primary branches forming the chief efferent veins of the bulb (Pl. II., Fig. 2).

M, *Urethral meatus*, vestibular intercommunicating plexus (isthmus) above; similar intercommunicating veins *within* the urethro-vaginal tubercle below. V, *Vaginal aperture;* cut vaginal edge of Nymphæ. A, *Anus.* T, *Tuberosity of ischium.* O, *Coccyx.* G, *Vulvo-vaginal gland*, surrounded by efferent venous branches from the bulb; the duct of the gland opening in the vestibule just in front of the margin of the vaginal aperture—*i. e.*, within the vaginal vestibule.

a, *Anterior border of Gluteus maximus muscle.* b, *Superficial Sphincter ani muscle.* c, c, *Pubo-* and *Obturator-coccygeus muscle*, closing upwards the posterior perineal space bounded by the coccyx, *O*; lower border of gluteus, *a*; larger sciatic ligament, *L*; tuberosity of the ischium, *T*; superficial perineal muscles, *d*, *d*; and inferior border of perineal septum, *f*. e, *Bulbo-cavernosus muscle*, partly removed to show its relations with the bulb. *i*, Anterior aponeurosis, and *k*, Posterior aponeurosis of perineal septum; intervening muscular fibres removed to show the vein. g, *Erector clitoridis muscle*, its anterior portion (Pl. I.). h, *Left crus clitoridis*, partly denuded of its musculo-fibrous tubular sheath.

Fig. 2.

The bulb and its urethral venous prolongations, detached; the former partly cut through to show its cavernous structure.

Fig. 3.

Side View of the Upper Venous Relations of the Bulb.

1, *Venous expansion* on the blunt end of the clitoris. 2, *Dorsal* vein of clitoris. 3, *Urethral* venous process of bulb. 4, Pubic communicating branches. 5, *Pars intermedia*, a double row of veins issuing from a double series of apertures at the under surface of the clitoris. 6, *Upper part of the bulb.* 7, *Suspensory ligament* of the clitoris. 9, Section of the right crus clitoridis.

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PLATE VII.

Relations of the Urethral and Vaginal Venous Plexuses with the Veins of the Clitoris and Bulb. The Right Side of the Pelvis removed by a Section, in Front, through the Pubic Body about an Inch from the Symphysis and, behind, through Sacro-iliac Joint.

B, *Bladder partially inflated*, and *b* (*bis*), Ureter cut just before it enters the bladder. V, *Vagina* distended, longitudinal fibres of lower half. P, *Section of pubis* to the right of the symphysis. R, *Rectum*, longitudinal fibres of its outer coat. C, *Clitoris.*

1, *Bulb.* 2, Its urethral venous process receiving one of the double rows of the pars intermedia. 3, *Lower efferent veins* going to the pudic vein. 4, *Dorsal vein* of the clitoris. 5, *Urethral venous plexus*, lying on the urethra between the bladder and the pubic side of the vestibule-sub-pubic ligament. 6, Commencement of vaginal venous plexus, larger lateral veins unavoidably removed with the surrounding pelvic cellular tissue. 7, 8, 9, 10, *Sciatic* and *gluteal* veins, corresponding to arteries. 11, *Uterine veins*, assisting to form the utero-vaginal venous plexus. 12, *Obturator vein.* 13, *Internal iliac vein.*

a, *Pyriformis muscle;* cross-section of it where it passes out of the great sciatic notch. b, *Larger sciatic ligament.* c, *Pubo-* and *obturato-* and *ischio-coccygeal* muscles. e, *Suspensory ligament* of the clitoris. f, *Bulbo-vaginal gland.* *g*, *g*, *g*, *g*, Roots of *Sacral plexus* of nerves, resting on the pyriformis muscle.

Free venous intercommunications exist between the perineal and pelvic venous systems. The following are of special practical importance:—1, The chain of communication commencing at the upper end of the bulb and passing along by the urethral, urethro-vaginal, and utero-vaginal venous plexuses. 2. The same from the lower end of the bulb through the branches of the pubic veins to the internal iliac vein. 3, Numerous chains of communication with the superficial perineal veins; many veins of the labia accompany their arteries, a greater number communicate with the veins of the bulb, and in this way the labial venous

circulation is connected with that in the pelvis. The interstitial veins in the vagina and female urethra forming there a true erectile plexus, have also free and multitudinous communications with the pudendal and pelvic veins. As none of these veins are provided with valves, the following forms, and indeed every form, of pudendal hæmatocele are readily explicable:—

1. Venous extravasation in the labium from external injury followed by a large labial hæmatocele.

2. Sudden extravasation quickly followed by an enormous pudendal hæmatocele at the ninth month of pregnancy without obvious cause.

3. Small circumscribed labial extravasation at the seventh month of pregnancy; no obvious cause.

4. Spontaneous extravasation in the urethro-vaginal tubercle at the seventh month of pregnancy.

5. The entire left labium, nymphæ, and adjoining part of the perineum transformed into an enormous tumor the size of a fœtal head, and of a dark mahogany color, discharging blood in abundance through an opening caused by local injury, requiring active hæmostatic remedies.

6. Death from exhaustive hæmorrhage through a small wound in the vagina at an advanced stage of pregnancy.

7. Death after immense hæmorrhage through a small spontaneous laceration in the upper part of the vagina at the end of pregnancy.

8. Immense thrombus at the lower part of the vulva, near the posterior commissure from a kick received there at the seventh month of pregnancy, followed by the expulsion of an enormous clot and fatal hæmorrhage.

9. Enormous hæmorrhage from a very small wound at the vaginal orifice from injury at the third month of pregnancy.

10. Very numerous instances of pudendal hæmatocele of the largest size and most rapid development occurring during labor and impeding delivery.

11. Pelvic hæmatoceles spontaneously developed (no obvious cause) coexisting with vaginal, labial, and crural venous varices.

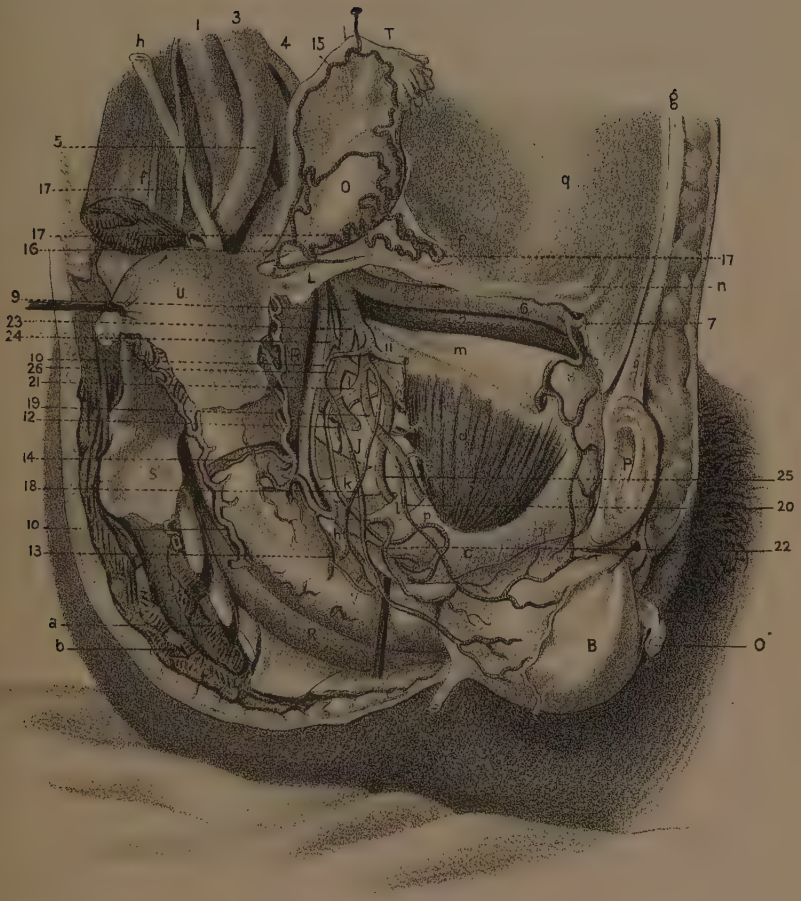
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PLATE VIII.

ARTERIES OF THE FEMALE PELVIC ORGANS.

The pelvis laid open by a section, in front through the pubic symphisis, behind, through the sacro-iliac joint. Peritoneal investments, subperitoneal pelvic tissue, veins and nerves, for the most part cleared away. The bladder detached from its attachments to the neck of the uterus and vagina, and drawn forwards. The *left* ureter cleared of its surrounding tissues, but otherwise undisturbed. The left psoas, gluteus, pyriformis and pubo-obturato-ischio-coccygeus muscles (levator ani) cut through to the right of the middle line. The fold of uterine sero-muscular platysma passing off from the uterus on each side at its lateral borders, cut close to the uterus to show the situation of the uterine artery. Alar mesentery and contents on the right side, removed.

1, *Vena cava inferior* resting on the right side of the fourth lumbar vertebra, receiving the right and left common iliac veins. 2, *External iliac vein* inclining under, then behind, the external iliac artery, both passing under Poupart's ligament. 3, *Abdominal aorta*—its termination at the left side of the fourth lumbar vertebra in the common iliac arteries. 4, *Inferior mesenteric artery.* 5, *Right common iliac artery*, resting on the vena cava inferior, at the point where the two common iliac veins unite to form it. 6, *External iliac artery*, left side, running along the margin of the pelvis, resting on the psoas muscle. 7, *Epigastric artery.* 8, *Obturator branch* of epigastric artery. 9, *Internal iliac artery* resting on the internal iliac vein, and communicating branch of the sacral plexus of nerves; it is crossed in front by the ureter, *h*. The common iliac arteries divide into the external and internal iliac arteries a little above the sacro-iliac symphyses. *At this point is attached the upper edge of the uterine lateral ligament, the two layers of which commence their separation along the course of the latter vessel.* 10, *Uterine artery* descending close to the ureter to a point below the os uteri, where it turns sharply upwards close to the uterine borders between the two folds of the lateral ligaments, to anastomose with the spermatic artery at the upper angle. 11, *Obturator artery ;* cut end; its course is along with and below the obturator nerve (*m*). *L, Round ligament ;* it derives from the epigastric artery an arterial branch which reaches the uterus. 12, *Inferior vesical artery.* 13, *Vagi-*

nal branch from it. 14, *Utero-cervical artery*, circumflex branch, forming with that of the opposite side a ring round the cervix uteri. 15, *Artery of the Fallopian tube* given off from the uterine artery at the upper angle of the uterus. 18, *Vaginal artery* anastomosing with the vaginal branch of the uterine artery. 17, 17, 17, *Spermatic arteries*, arising from the fore part of the aorta a little below the renal arteries; they descend crossing the ureter under the peritoneum to reach the alar duplicature of the lateral ligament, in which they proceed to the hilus of the ovary. 19, *Pudic artery* passing out of the larger sacro-sciatic foramen in front of the sciatic nerve, and close to the spine of the ischium. 20, *Superior vesical artery*—pervious remnant of hypogastric artery (fœtal). 21, *Inferior hæmorrhoidal artery* joined to 22, another *inferior vesical branch.* 23, *Posterior division of internal iliac artery*, terminating in 24, *Ilio-lumbar lateral sacral;* and 25, *Gluteal.* 26, *Sciatic arteries.*

B, *Bladder* detached from its connections with the vagina and uterus: the cut edge of the vesico-uterine peritoneal fold or angle of peritoneal reflexion from one viscus to the other. O^1 (*bis*) *Urachus.* V, *Vagina* undistended—a flat tube resting on R, the *Rectum.* O, *Ovary.* T, *Fallopian tube*, elevated to show the course and anastomoses of the *Spermatic artery* (17), with the uterine artery. 15, *Fallopian branch.* U, *Uterus*—its fore part covered by its inseparable layer of *Musculo-serous* (Platysma) investment. L, *Round ligament*—muscular cord derived from the muscular fibres of the uterus near the upper angle, and the anterior layer of the uterine platysma, proceeding to the inner inguinal ring, *N*, which marks a slight depression of peritoneum (canal of Nuck). S, *Sacral articular* surface of sacro-iliac symphysis. P, *Pubic symphysis*—articular surface.

a, *Pyriformis muscle* supporting sacral plexus of nerves, and further forwards the *ischio-coccygeus* muscle. b, *Gluteus maximus muscle.* c, *Obturato-coccygeus muscle*, arising from the curved aponeurotic line, marking the junction of the recto-vesical aponeurosis with that covering the obturator muscle; it extends from the body of the pubis to the spine of the ischium at *p*, which marks the origin of the *smaller sacro-sciatic ligaments.* *f*, *f*, Psoas muscles, that on the left side intact, and covered by the pelvic fascia. *g*, Linea alba. *h*, *h*, *Ureters* descending on the psoas muscles, under the spermatic arteries which cross them somewhat above, where they cross the common iliac arteries (at their bifurcation) to enter the pelvis; at this point they lie within the broad ligament, close to the round ligament under which they descend behind, and in close contact with, the uterine artery, gradually approaching the uterus; finally they turn forwards by the side of the uterine cervix, passing first behind the utero-cervical venous plexus, then *through* it to reach the bladder within the vesico-vaginal septum; they enter the bladder about half an inch in front of the uterine cervix (Pl. XI., Fig. 2).

i, *j*, *k*, *l*, Trunks of sacral nerves resting on the pyriformis muscle; *m*, obturator nerve; *q*, peritoneum covering the transversalis fascia.

A ligature constricting the uterine cervix or vagina just below its uterine attachments, keeping close to those parts on applying it, would avoid the ureter and command the artery; but the inosculations of the uterine artery with the spermatic artery at the upper angle of the uterus are so large that controlling one and not the other would be useless (Pl. XI.).

The uterine artery first comes in contact with the uterus just above the uterine insertion of the vagina. From this point upwards it is alone liable to be involved in lateral section of the cervix. The circular branch when present is occasionally large enough to give trouble.

The vesical and vaginal branches (always present) are very uncertain in situation, and so cause unexpected embarrassment in operations, for instance in that for vesico-vaginal fistula (Pls. XXIII., XXIV.).

The uterine artery is occasionally extremely small, and the reverse, a variety associated with a similar but reverse irregularity of the spermatic artery.

The portion of sero-muscular uterine covering at *U* marks the width of the lateral ligaments. The uterine artery descends between its two layers at its sacro-iliac attachments, and ascends between them at its uterine attachments. The intervening portion of the vessel lies somewhat below within the utero-iliac cellular process (Pl. XII.).

For the parts critically concerned in the operation of total excision of the uterus—viz., Ureters, uterine vessels, &c., vide Pl. XI., Fig. 2.

Fig. 2.

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Fig. 1.

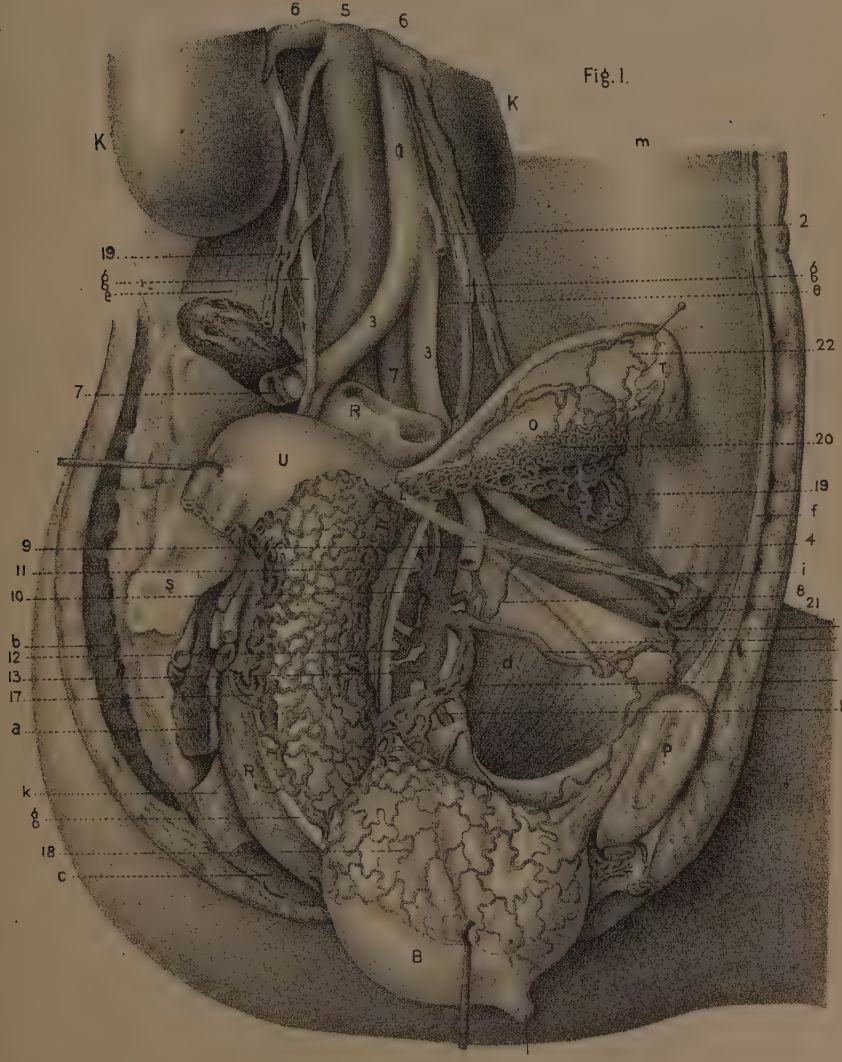
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PLATE IX.

VEINS AND ERECTILE VENOUS PLEXUSES OF THE FEMALE PELVIS.

Pelvic sections similar to those in Pl. VIII.

FIG. 1.

B, *Bladder*, cut at the urachus and turned forwards. R, *Rectum. Round ligament.* U, *Uterus.* O, *Ovary.* V, *Vagina.* S, *Sacro-iliac articulation.* K, *Kidney*, corresponding to the three upper lumbar vertebræ. T, *Fallopian tube.* P, *Pubic symphysis.*

a, *Pyriformis muscle*, cut through at the sacro-sciatic foramen. b, *Gluteal muscles.* c, *Ischio-coccygeus muscle.* d, *Internal obturator muscle.* e, e, *Psoas muscles.* f, *Linea alba.* g, g, *Ureters.* h, *Obturator nerve.* i, *Internal inguinal ring*, site of canal of Nuck.

1, *Abdominal aorta.* 2, *Inferior mesenteric artery.* 3, 3, *Common iliac arteries.* 4, *External iliac artery.* 5, *Vena cava.* 6, *Renal veins*, the left one crossing the aorta and receiving the left ovarian or spermatic veins. 7, 7, *Common iliac veins.* 8, *External iliac vein.* 9, *Internal iliac artery.* 10, *Gluteal.* 11, *Ileo-lumbar.* 12, *Sciatic.* 13, *Pudic.* 14, *Obturator.* 15, 16, *Epigastric veins*, corresponding to arteries (Pl. VIII.). 17, *Uterine vein*, or veins (generally double) communicating with the utero-vaginal venous plexus—a very large plexiform collocation of veins situated on each side of the upper end of the vagina, receiving from below the vaginal venous plexus, and from above the uterine venous plexus; the ureter passes behind, and then through it, to reach the bladder (Pl. XI., Fig. 2). 18, *Vagino-vesical* venous rete, ramifying in the vesico-vaginal septum. 19, *Spermatic veins.* 20, *Bulb of the ovary*, a club-shaped venous body in which the ovary and utero-ovarian ligament are partly embedded. At its smaller or uterine end it communicates freely with the uterine venous plexus, below with the spermatic venous plexus, which end in the spermatic veins (19). 21, *Vein to round ligament.* 22, *Fallopian veins.*

FIG. 2.

Separate View of Bulb of the Ovary with its Venous Connections.

1, *Uterine vein* and plexus. 2, *Sub-ovarian venous plexus.* 3, *Commencement of spermatic veins*, the left opening into the left renal vein. O, *Ovary.* T, *Fallopian tube.* U, *Uterus*, its sero-muscular platysma partly removed to show the veins (Pl. XI., Fig. 2).

The very arbitrary and superabundant nomenclature of pelvic sanguineous effusions would appear to be fairly reducible into two practical denominations—viz., pelvic cellular and pelvic peritoneal sanguineous extravasations. Pelvic varices must needs be sub-peritoneal. Blood extravasations into the peritoneal cavity are of constant occurrence. Angioma in all forms (Pl. XII.) is a chief pathological feature of the pelvic vascular system; but is a large sub-peritoneal hæmatoma, comparable in size to a peritoneal hæmatoma, possible? On anatomical grounds sub-peritoneal or cellular hæmatoma—small blood accumulations within or in the immediate neighborhood of the venous plexuses—are believed to be far from rare; but viewing the fixed relations of the pelvic peritoneum, which as far as is known are disturbed only through the slow disintegrating process attending the formation of matter, a sub-peritoneal Hæmatoma of large size would appear an impossibility.

Cases.

1. Sudden faintness at a ball; death half an hour afterwards; pelvis full of blood derived from rupture of sub-ovarian plexus.

2. Long-standing venous varices in both legs, the right labium, and the vagina of the same side; sudden faintness, prostration, pallor; immediate formation of a peritoneal hæmatocele, which filled up the left iliac half of the pelvis and rose to within an inch of the umbilicus. Rupture of left sub-ovarian venous plexus.

3. Sensation of something giving way internally, followed by slowly increasing tumefaction in the lower part of the abdomen, which eventually entirely filled the latter to the navel. Rupture of sanguineous cysts of both ovaries. Some sanguineous effusion beneath the peritoneum.

4. Sudden death at the commencement of a menstrual period, the menstrual fluid not having yet appeared externally. Intense congestion of genital organs, uterus the size and shape of a large pear. Firm adhesion between the right tube and ovary. Rupture of left ovary. Two ounces of blood in the pelvic peritoneum. *The uterine cavity contained a little fluid blood, which when wiped away was quickly renewed by slight compression through innumerable vascular orifices.*

5. Sudden cessation of menstruation after the use of the cold bath, followed immediately by most acute abdominal pains; obstinate constipation; speedy death. Lower part of abdomen filled with blood. The right ovary transformed into a mass resembling a tough coagulum; both Fallopian tubes dilated.

6. Sudden symptoms of peritonitis with signs of internal hæmorrhage; death in thirty hours. Extensive peritoneal hæmatocele. Rupture of right ovary—enormously increased in size, in structure, and resembling the spleen.

7. Sudden cessation of menstruation after local use of cold water, followed immediately by pain in the left hypogastrium, slowly progressive tumefaction of lower part of abdomen for eight months, then rapid distention of abdomen by ascitic effusion. Ovariotomy. Ovary transformed into a friable mass twice the size of a fœtal head, of a chocolate color, retained by its cortex, much attenuated; two cysts in the interior containing cheesy pus.

8. Signs of peritonitis when in expectation of the menstrual discharge, which did not appear; death in seven days; enormous peritoneal hæmatocele. Rupture of left Fallopian tube.

9. Menorrhagia; uterine colic. Soon after which signs of internal hæmorrhage; death in twenty hours. Rupture of Fallopian tube, which was enlarged to the size of the finger.

10. Abortion, with much uterine hæmorrhage; intense pain of abdomen; death in five days. Enormous peritoneal hæmatocele; both Fallopian tubes distended by clots which projected from their peritoneal terminations.

The above forms of Peritoneal Hæmatocele are fairly attributed to the uterine system; but instances quite as conspicuous occur which do not admit of such a solution. Blood effusions from any point of the peritoneal surface would gravitate towards the pelvis, forming Hæmatomas, presenting physical signs precisely the same as those attending the instances above quoted.

For additional reasons against the probability of sub-peritoneal pelvic hæmatoma, *vide* Pl. XIII.

Dr. Graily Hewitt (Diseases of Women) believes in the possibility of extremely large extra-peritoneal hæmatoceles; he gives (pages 472–3) two figures of two morbid preparations, showing extensive hæmorrhagic effusions; but then, he says, they *appeared* to be extra-peritoneal.

Intra-peritoneal Hœmatocele occasionally provokes plastic exudation on the part of the peritoneum with the result of encapsuling the Hœmatoma. The upper part of this capsule has probably been mistaken for an elevated portion of peritoneum covering a so-called sub-peritoneal Hœmatoma.

Fig. 1.

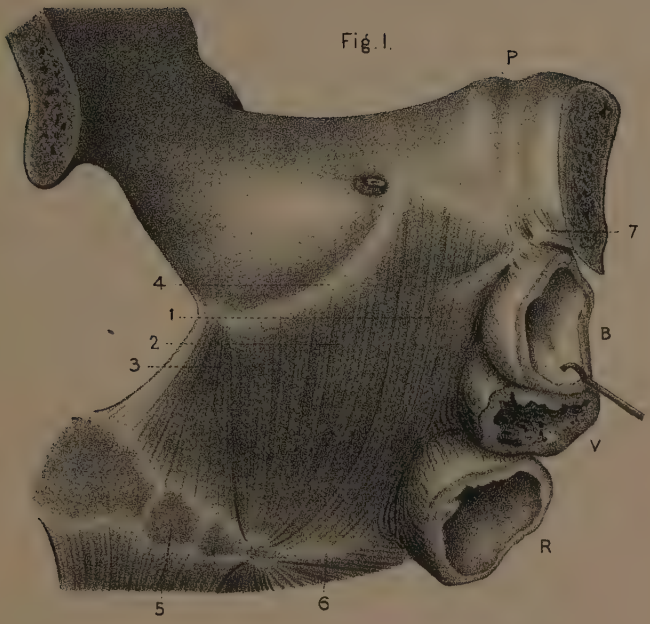

Fig. 2.

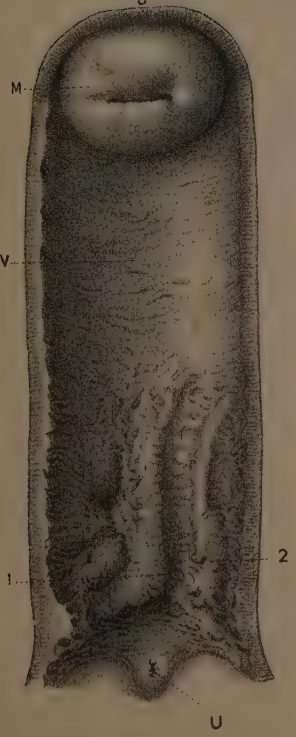

Fig. 3.

PLATE X.

FIG. 1.

Relation of the Muscular Floor of the Pelvis to the Bladder, Vagina, Rectum, and Coccyx.

1, *Pubo-coccygeus muscle*, arising from the inner surface of the pubic bones by distinct muscular strands, its median fibres descending by the side of the urethra and vagina, some of them turning in between vagina and rectum to meet similar fibres from the opposite side in the perineal body. Another more outward series of fibres turning in beneath the rectum, with those of the other side forming muscular loops intermixing with the lower circular fibres (internal sphincter) of the rectum; the remaining fibres still more outward joining their opposite fellows, at a sort of median raphé (6), to be finally inserted into the sides of the last bones of the coccyx. 2, *Obturator-coccygeus muscle*, arising along the curved aponeurotic line of junction between the obturator fascia and recto-vesical fascia (removed); its fibres converging are inserted into the sides of the two last coccygeal bones. 3, *Ischio-coccygeus muscle*, resting on the smaller sciatic ligament, arises from the spine of the ischium, its fibres diverging are inserted into the sides of the lower bones of the sacrum and into the side of the coccyx as far as the insertion of the former muscle (5). 7, Aponeurotic additional fibres (*Arcus tendineus*, Luschka), to the fascia covering the pubo-coccygeus muscle, giving attachment to some of the anterior or pubo-muscular prolongations from the longitudinal coat of the bladder. B, *Bladder*. V, *Vagina*, showing the lower portion of the additional longitudinal fibres (retractor vaginæ, Luschka). R, *Rectum*.

Compare with Pl. XIX. in regard to the surgical relations of the coccyx.

FIG. 2.

Upper half of Vagina and Vaginal Surface of the Vesico-vaginal Septum, full size.

1, 2, *Anterior columns of vagina;* U, the *Urethral orifice;* also numerous elevations of the inner coat of the vagina, not plicæ nor rugæ, but

ineffaceable erectile processes, in structure similar to that of the columns. *V*, marks a point on a line with, and midway between, the two apertures of the canals in the bladder for the ureters, subject to normal variations, as above indicated. M, *Vaginal* end of uterine cervix. The columns and processes (always present) vary infinitely in size and shape.

Fig. 3.

Distribution of the Vessels (of the Veins chiefly) of the Uterine Body, taken from a corroded preparation.

A, *Uterine artery.* V, *Uterine veins.* The larger superficial portion comprehends the veins forming the uterine venous plexus. It covers all the plexiform muscular cortex of the uterine body, and is covered by uterine musculo-serous platysma. Compare with Pl. XI., Fig. 2.

The more central and finer veins are continuous with the minute intermuscular spaces in the erectile uterine medulla. The uterine arterial subdivisions consist of minute spiral branches opening into these spaces; of muscular branches; and of branches to the uterine lining membrane (Pl. XII.).

The *Parovarium* is a horseshoe-shaped arrangement of tubules; its outline is defined by a single tube which surmounts from ten to fifteen tubules, communicating with its inner border; the latter and the two ends of the former, converge towards the ovary, terminating in closed endings near the hilus. The tubules consist of an outer (circular) and inner (longitudinal) layer of fibres (muscular?); they are lined by ciliated epithelium, and generally are found filled with a transparent fluid coagulable by acetic acid (mucin).

Fig. 2.

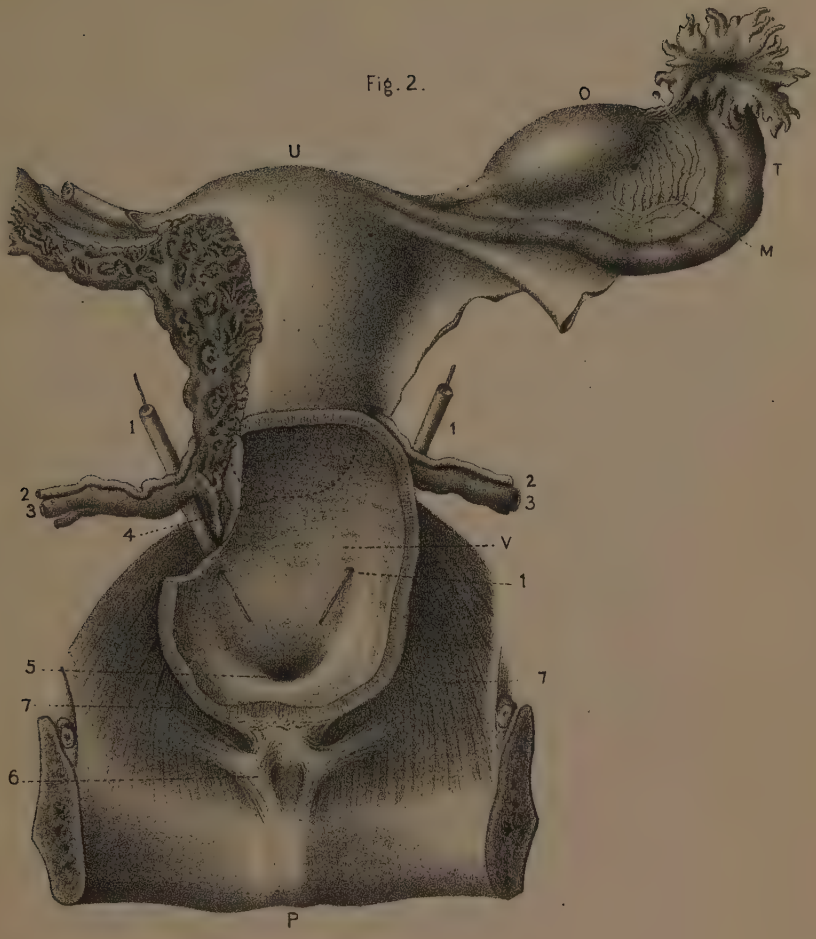

Fig. 1.

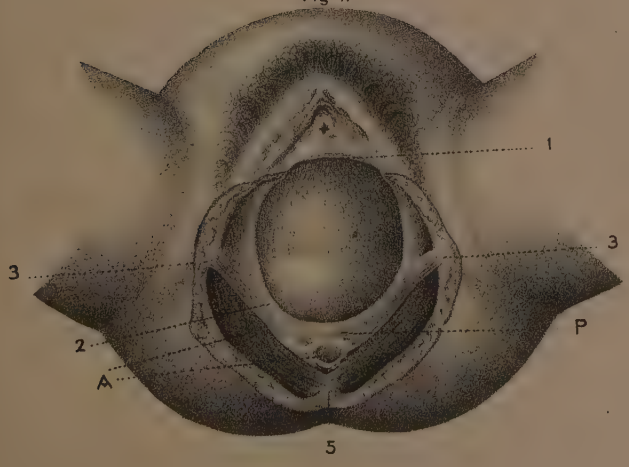

PLATE XI.

FIG. 1.

The Relations of the Muscular Floor of the Pelvis to the Presentation at the Last Stage of Parturition.

1, Upper margin of *Vaginal ring*, part of the perineal septum cut away to show more completely the pubo-coccygeal muscle. 2, *Ischio-perineal Ligament* and superficial transverse muscle, deflected downwards by the presentation; 3, their attachment to the tuberosities of the ischium. 4, Lower part of the pubo-and obturato-coccygeus muscles. P, *Perineal body*, extremely on the stretch and attenuated in proportion. A, *Anus*, flattened and carried back towards the coccyx. The clitoris and its pendant nymphæ *left unaffected* (Pl. II.).

FIG. 2.

Vesico-vaginal Septum and Base of Female Bladder.—Anatomical Relations of Ureters at their entrance into the Bladder.—Contents of Alar Ligament.

1, 1, *Ureter*, inclining forwards behind the uterine artery and uterine veins, and turning forwards, and inwards, behind and then through the *utero-vaginal venous plexus*, to enter the bladder through a channel piercing its coats in succession obliquely in the same direction. Their points of entrance into the bladder are usually between an inch and a half to two inches apart, at a distance of from half an inch to three-quarters in front of the uterine cervix. Their points where they open into the bladder are about an inch and a quarter apart, the length of their intermediate course through the coats of the bladder about three-quarters of an inch. These relations, however, are subject to normal variations. *Uterine artery.* 3, One of the *Uterine veins;* there are usually two. 4, Dotted line indicating the vaginal end of the uterine cervix. 6, Ligamentous process of fascia of pubo-coccygeus muscle (arcus tendineus) and vesico-pubic muscles. 7, Pubo-coccygeus muscle.

U, *Uterine body*, on the right side partially denuded of its *sero-muscular platysma* to show the uterine and utero-ovarian venous plexuses.

The Anatomical Relations of the Alar Ligament and its Contents.

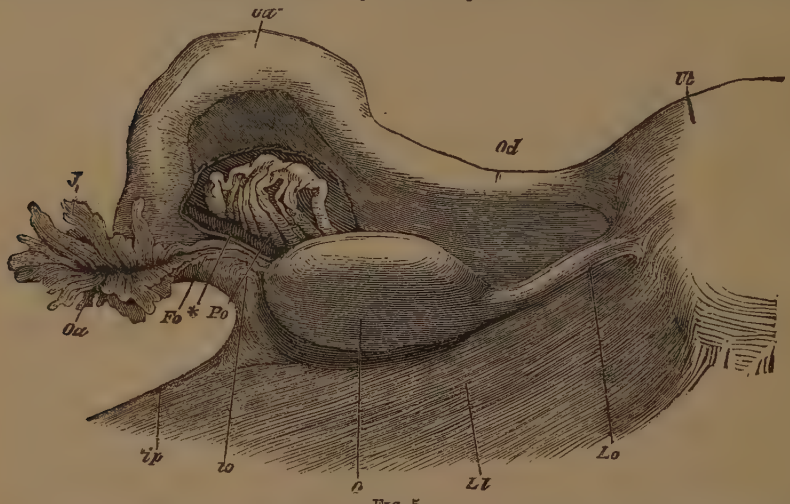

FIG. 5.

Ut, Uterus. *O*, Ovary. *Oa*, Infundibulum and Abdominal Aperture of the Fallopian Tube and Fimbriæ. *Fo*, Fimbria attached to the Ovary. *Po*, Parovarium. *io*, Marginal fold of Broad Ligament continued on to the Infundibulum (Infundibulo-ovarian Ligament). *ip*, the same fold connecting the former with the pelvis. *Od*, Isthmus of the Fallopian Tube. *Od'*, Ampulla. *, Fimbrio-ovaric groove, lined by Mucous Membrane covered by Ciliated Epithelium. *Ll*, Muscular Striæ under Posterior Layer of Broad Ligament. *Lo*, Muscular Utero-ovarian Ligament.

O, *Ovary*, utero-ovarian muscular ligament, and grooved fallopio-ovarian fimbriæ. T, *Fallopian tube* and fimbriæ inverted. M, *Parovarium*, between the sero-muscular folds of tubal mesentery. The rest of the uterine body enveloped in its platysma, which enfolds also the above-mentioned contents of the alar ligament, which it forms; lower down, the uterine end of round ligament and uterine end of broad ligament (Pl. XIII.).

Transverse Cross Section of the Fallopian Tube at the Ampulla: the lower half.

FIG. 6.

1, Mucous Membrane. 2, Muscular Coat. 3, Connective Tissue (subserous adventitia).

The Fallopian tubes are generally of unequal length in the same subject. The left tube as often as the right, and *vice versa*.

Each fold is composed of a double layer of ciliated epithelium sustained by a central membranous ridge. These ridges are true membranous processes, and are not effaced by mechanical dilatation of the Tube. They exist in infinite variety. Some are simple ridges of low elevation; others, much broader at the base and extending farther inwards, subdivide into sub-

sidiary ridges at their edges, each subdivision being covered by a double epithelial fold like the former.

Cross Section of some of the Plicæ seen under a higher power.

FIG. 7.

** * *, Lymph spaces within the ridges. The extremely irregular plications due to the arrangement of the ridges as above indicated.

The Foliated Appearance of the Terminal Plicæ as seen unmagnified, and wrongly suggestive of a series of Parallel Folds and Intervening Sulci.

FIG. 8.

The Epithelial covering of these processes is ciliated and devoid of glands, the "set" of the cilia being towards the uterus.

Cross Section of an Ovary from a Subject aged 18 Years.

FIG. 9.

1 and 2, Epithelium and cortical connective tissue zone. 3, Follicular zone. 4, Vascular Medulla, composed of vessels derived from the Bulb of the Ovary (Pl. VI. Fig. 2). 5, Central nucleus of loose connective tissue, varying greatly in extent and conformation in different ovaries, on which the ovarian zones are, as it were, moulded.

Longitudinal muscular striæ exist within the ridges, the circular muscular layer so covered by a second longitudinal muscular layer subjacent to the adventitia. The latter is permeated with innumerable vessels, lymphatics, and nerves. In a well injected preparation the texture of the fimbriæ, the terminal ones especially, is quite obscured under a brilliant vascular network.

The arteries before they reach the follicular zone are pre-eminently spiral, a conformation sustained by accompanying connective tissue fibres and muscular (?) striæ.

Figure 11, is from a preparation treated by an alkali, which by dissolving out the nuclei, shows the polygonal-shaped cells of the follicle and the connective tissue fibres intervening.

The entire stroma of the ovary is furthermore remarkable by reason of the nucleated cells

which more or less pervade every part of it. They vary much in size and shape ; most of them are spindle-shaped, many are round, angular, or even branched, the latter probably being analogous to the branched cell canaliculi seen in normal connective tissue in all forms, and having similar relations with the radicals of the lymphatics with which the ovary is abundantly provided.

The Cortical Connective Tissue Zone, so-called Albuginea, and the Follicular Zone, under a higher power.

FIG. 10.

1—3, Layer of connective tissue fibres in a line with the section. 2. Cut ends of fibres of the intervening layer in direction crossing the two former. 4. A zone of connective tissue fibres crossing one another in all directions. 5. Graafian Follicle sembedded in a similar tissue. *a*, Follicle. *b*, Nuclei of the polygonal cells of which it is composed. *c*, Vitellus ; a finely granular mass. *d*, Vesicula Germinitiva (Purkinje) enclosing the Macula Germinitiva (Wagner), that is the nucleus and nucleolus, surrounded by the Vitellus answering to the granular contents of an ordinary cell, eventually to be surrounded by the Vitelline membrane (Chorion).

The preparation figured above was treated with acetic acid, which by rendering somewhat transparent the connective tissue stroma, brought into view, besides the nuclei of the follicle, the innumerable nuclei with which the connective tissue stroma is beset.

Follicles containing ovules at varying stages of maturity are usually found in the ovary (Pl. XVI.). A vascular connective tissue is first formed around the advancing follicle, the nucleated polygonal tissue of the latter being soon transformed into an envelope of similar structure but more delicate, and containing numerous round and spindle cells. Both envelopes at an early stage are easily detached from the ovarian stroma and from each other, owing partly to the arrangement of lymphatics accompanying the blood-vessels and their lymphatic spaces.

After the escape of the ma-

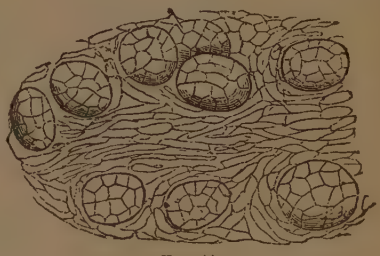

FIG. 11.

ture ovum the follicular tissue collapses in the form of an irregularly plicated sac, in the end nearly filling the cavity of the outer tissue with folds too intricately tortuous to be followed out. Minute but well formed specimens of the same character may generally be detected in the follicular zone. Collapsed unruptured follicles ; remnants of abortive ovulation at an early stage (?), *but the same are apparent, and not rarely in the ovaries of the fœtus at term* (page 37).

The ovarian peritoneal covering is so identified with the subjacent peripheral connective tissue zone of the ovary that it appears as a simple layer

Section of a Young Ovary at Term.

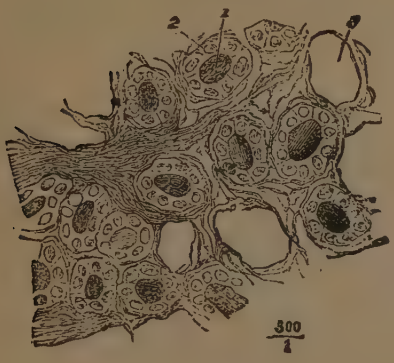

FIG. 12.

1, Ovule. 2, Follicle. 3, Empty space; the follicule loosely attached to the stroma, having tumbled out in making the preparation.

A Section of the Follicular Stroma, showing the Direction of the Minute Arteries going to the Follicles, and innumerable nucleated Spindle Cells to which the Nuclei before mentioned belonged.

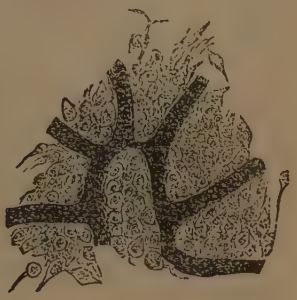

FIG. 13.

Section of Follicle $^{120}/_{1}$ after abortive Ovulation.

FIG. 15.

Area of connective tissue surrounded by the collapsed and crumbled follicular tunics. Members of these remnants are observable in the central portions of the cortical follicular Zone of the ovary, even in ovaries at birth. * Stroma of the Ovary.

Graafian Follicle and Ovum.

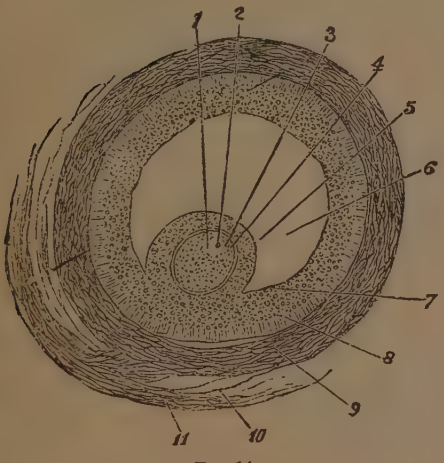

FIG. 14.

1, Vacuole in place of the nucleus, which has disappeared. 2, Nucleolus or germinating spot (Wagner). 3, Cell-mass of finely granular protoplasm partially undergoing fatty granular transmutation (Yolk). 4, Chorion or Zona Pellucida. 7, 8, Membrana Granulosa (Tunica Propria, Henle). 7, Inner layer of round cells. 8, Outer tunic of Cylinder cells. 6, Follicular cavity containing albuminous matter. 5, Ovum embedded in a cumulus of the round cell layer of the follicle. 9, Tunica Fibrosa (Henle) of the follicle. These Tunics, the Tunica Propria and Fibrosa, at an early stage of ovulation are easily separable from each other, and the latter from the stroma of the ovary. 11, Later on they are mutually more adherent through the numerous vessels derived from the Stroma. 10, Connective tissue loosely connecting the Tunica Fibrosa with the latter.

Cells from a Giant-celled Tumor of the Upper Jaw.

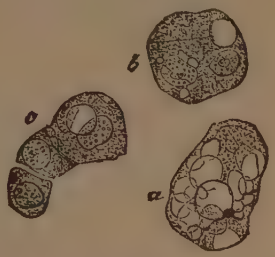

FIG. 16.

The mature giant-cells of the tumor contained nuclei in proportion to the size of the cell. All degrees of vacuolation may be found on the same case, *e. g.*, cells of the signet ring type (partial disappearance of the nucleus with a "cumulus" of granular protoplasm at some part of the periphery or the latter only). The variety on which a small round cell (white blood corpuscle?) survived the vacuolation occurs in nearly all cases (Creighton). *a*, *b*, *c*, varieties of vacuolation. Compare with figure representing ovulation.

of epithelium—pavement epithelium (Sappey, 1864)—columnar epithelium Waldeyer); the latter is certainly its prevailing character. The peritoneum has similar relations with other abdominal organs; in regard to the ovary the peculiarity in the epithelium is the only exception.

The ovary originally is a flat band of molecules of amœboid protoplasm; it becomes glandular through changes such as occur in the formation of simple glands. A sweat-gland is at first a flasked-shaped mass of cells, downgrowths apparently direct from the surface; the central cells disappear, converting the solid cylinder into a secreting cæcal tubular gland. In the case of the ovary these flask processes speedily show segmental constrictions, "ova chains" (*Eisträngen*, Pflüger), each segment closing in around a corresponding mass of cells, one (perhaps two) of which becomes the future ovule, the remainder the membrana granulosa. By the *contemporaneous* formation of the connective tissue stroma and segmentation of these processes, the components of the ovary assume the relations above indicated.

PLATE XII.

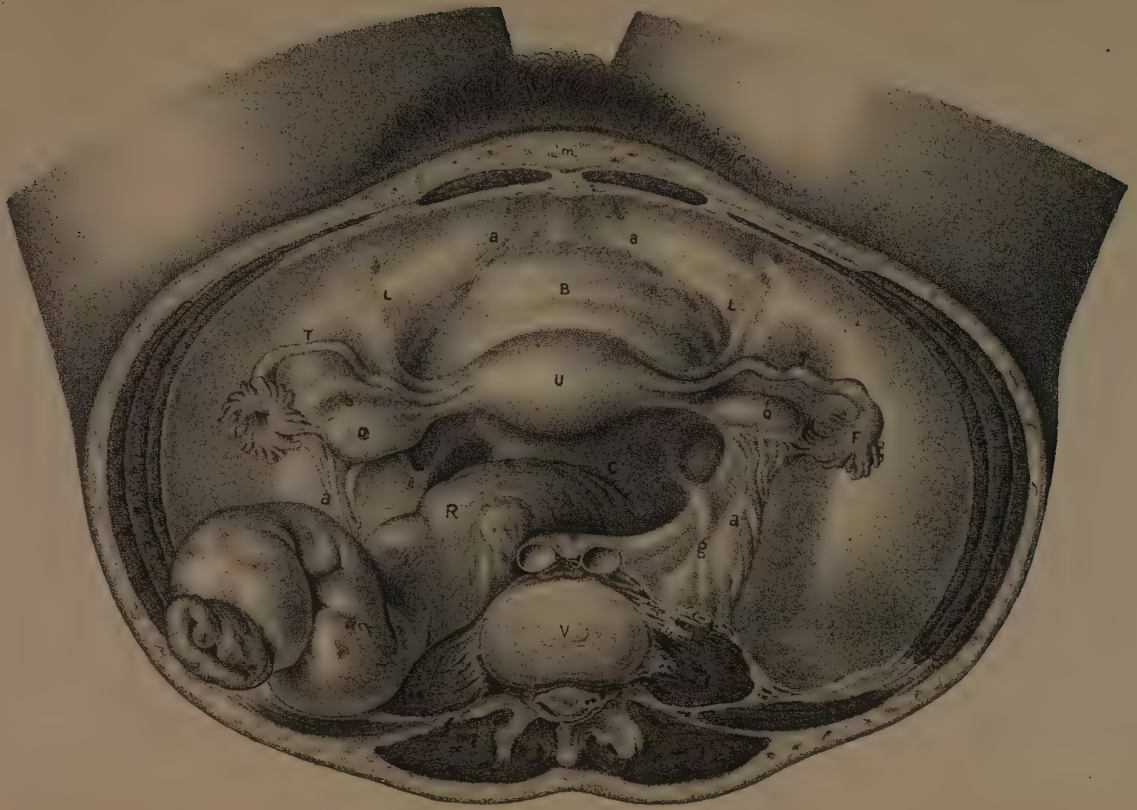

PLATE XII.

THE RELATIONS OF THE FEMALE PELVIC ORGANS WITH THE PELVIS AND WITH ONE ANOTHER. PERITONEAL AND SUB-PERITONEAL PELVIC SPACES.

PERITONEAL PELVIC SPACE. HALF SIZE.

Horizontal section of the Abdomen immediately above the Crests of the Ilii; behind, between the last Lumbar Vertebræ and Sacrum, in front, about an inch above the Pubis.

B, *Fundus of bladder*, moderately distended. U, *Uterine body*. O, *Ovary*, and *utero-ovarian fibro-muscular ligament* attached to the upper angle of the uterus, behind and beneath the entrance of the Fallopian tube. L, *Round fibro-muscular ligament*, passing off from the upper angle of the uterus in front of the tube to the inner ring at L. T, *Fallopian tube* passing *through* the uterine walls to open into the uterine cavity at its upper angle (Pl. XVII., Fig. 1)—its infundibulum at *T*, fimbriæ at *F* (Pl. XI., Fig. 2). *V*, upper surface of the first bone of the sacrum. R, *Rectum* and continuation into sigmoid flexure of the colon, lying to the left side of the iliac vessels, seen in front of *V*. *The rectum has muscular connections with the utero-sacral ligaments*, c.

a, *a*, Behind, spermatic vessels and nerves reaching the hilus of the ovary, under the reflexion of the posterior fold of broad ligament. *b*, Site of parovarium and bulb within the tubal mesentery. *a*, *a* (*in front*), obliterated remnants of hypogastric arteries (antero-lateral ligaments of the bladder). m, *Urachus* (anterior vesical ligament). c, *Utero-sacral ligaments*, crescentic prolongation of sero-muscular uterine *platysma*, containing besides muscular fibres prolonged from the vagina and uterine cortex. g, *Ureter*, descending into and crossing the retro-ovarian fossa. m, *Site of Urachus*. (*Vide* Uterus.)

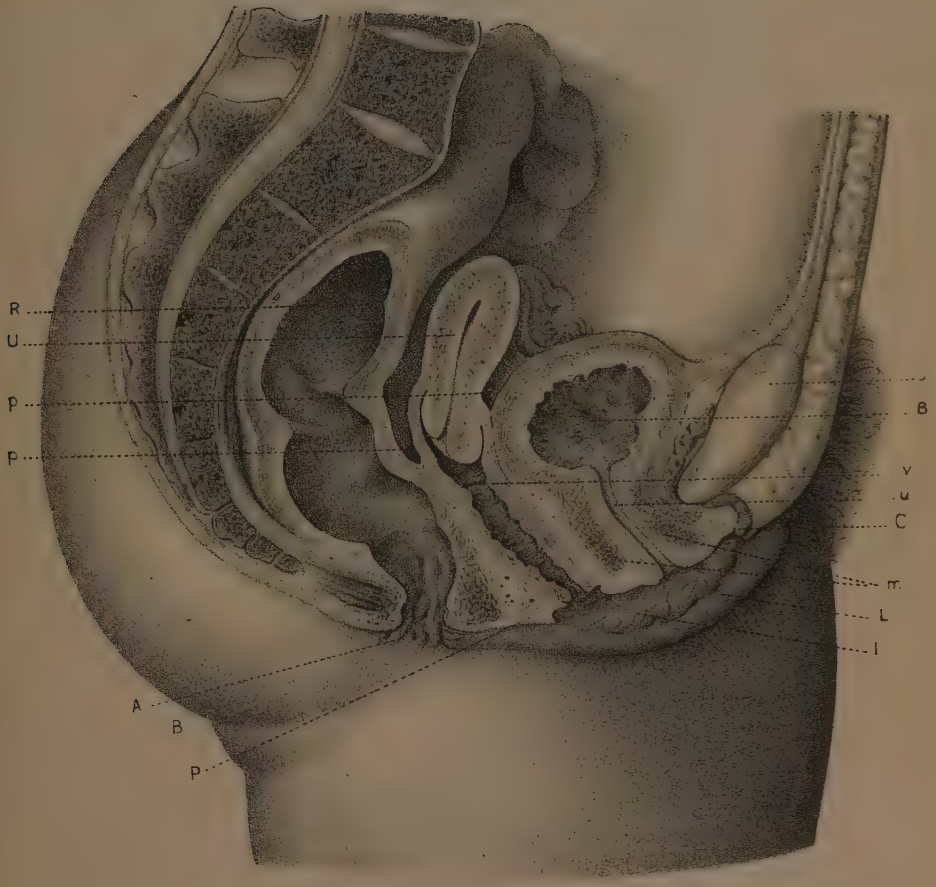
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PLATE XIII.

PROFILE VIEW OF THE SAME SUBJECTS.—HALF SIZE.

Median Perpendicular Section of Pelvis from front to back, showing both Pelvic Spaces.

A, *Anus*, marking the columns of Morgagni. R, *Rectum*, projections in the cavity—the valves (?) of Houston. These folds include *all* the coats of the rectum, and are readily effaceable by slight distention. Note minute circular markings at the anal end, indicating transverse sections of the inferior circular fibres of the rectum (internal sphincter), and lines near the coccyx indicating the posterior half of external sphincter, the coccygeal attachment of the pubo-coccygeal muscle, and the recto-coccygeus muscle, or *retractor recti*, Luschka. *U*, Left half of the uterus; its central more vascular, erectile portion surrounded by its internal and external muscular cortex; its cavity a mere rima between its antero-posterior surfaces. V, *Vagina*, its muscular coats gradually losing themselves on the uterine neck up to its junction with the uterine body; the uterine neck projecting into the vaginal cavity, so that the long axis of the uterine cavity is nearly at right angles with the axis of the former. B, *Bladder*, moderately distended; its outer longitudinal coat in front passing off to its attachments to the inferior edge of the pubic symphysis, and to the ligamentous process of the pubo-coccygeal muscle (Pl. XI., Fig. 2), bridging over the urethro-pubic venous plexus, separating that space from the vesico-pubic space above, which is bridged over by the vesical ligaments formed by the urachus and two remnants of the hypogastric arteries; cross sections of the internal circular muscular coat of the bladder; internal mucous folds of loosely adherent lining membrane, covering the lattice-like projections of the inner circular coat into the vesical cavity, black point indicating the entrance of the left ureter. C, *Section of Clitoris.* L, *Vulvar labium.* I, *Nympha.* P, *Perineal body* (Pl. I.), black dots indicating the site of its many small vessels; behind it, anterior sections of the lower circular fibres of the rectum (internal sphincter). S, *Pubic symphisis* and vesico-pubic space. u, *Urethra*, inner longitudinal muscular coat surrounded by m, m, *outer circular coat*, those at *u constituting a true compound sphincter composed of organic and*

voluntary muscular fibres. *p, p,* Vesico-uterine and recto-uterine (Pouch of Douglas) peritoneal folds.

Vesico-vaginal septum; the faint line along the vesical portion indicating the loose cellular kind of attachment between bladder and vagina as far as the lower half of the urethral portion. The remainder is a true incorporation of adjoining vaginal and urethral structures.

PELVIC CELLULAR SPACE.

A plane passing from the posterior surface of the pubis about its middle to the junction of the third and fourth sacral bones—the sacral attachments of the utero-sacral muscles, cutting the uterus at the junction of the uterine body and uterine cervix, would, upon the whole, with trifling exceptions, divide the pelvic cavity into *peritoneal* and *sub-peritoneal cellular* pelvic spaces. The contents of the pelvis below this plane are embedded in the pelvic cellular tissue which occupies that part of the cavity not occupied by pelvic viscera. This tissue is composed of muscular, fibro-elastic, and connective elements, one or more elements predominating *exactly* according to the physical relations it has with the organs it encloses and sustains. The erecto-plexiform character of the pelvic venous plexuses is entirely due to the structure and disposition of the musculo-cellular portion belonging to them, as is also the mutual relations of the pelvic organs and their resistance to displacement; in this respect much of it represents so many ligamentous processes. The pubo-sacral cellular process attends the urethro-vesico-vagino-uterine chain of venous plexuses, and forms a part of the utero-sacral ligaments. The utero-iliac cellular process in the same way accompanies the uterine vessels, forming a resisting fibro-cellular bond between the uterus and the sacro-iliac articulation. Thus the uterus comes to be suspended in the centre of the pelvic cavity, these processes acting upon it as so many lines of tension. The vagina, similarly, is kept extended by the pubo-sacral process, which, besides, through its lateral prolongations to the sides of the pelvis, tends to draw it into the shape of a *flattened* tube. No pelvic organ is without more or less of this cellular or musculo-cellular covering. The lower two-thirds of the urethra, where no cellular tissue is interposed between it and the coats of the vagina, is scarcely within the pelvis. The sub-peritoneal cellular tissue above the pelvic plane obviously communicates without interruption with the sub-peritoneal cellular tissue below it.

PERITONEAL PELVIC SPACE.

The peritoneum covers such parts of the pelvic organs as project above the pelvic plane. The surgical interest of the pelvic peritoneum depends for the most part on its substratum. The membrane itself consists

merely of a thin and exceedingly extensile basement-membrane covered by epithelium, and is incapable by itself of exercising the least ligamentous control over the parts it covers; to these it adheres in inverse proportion to the quantity of intervening (never entirely absent) cellular tissue. The sub-peritoneal investment of the uterine body and its appendages is a muscular platysma, which moreover forms the greater part of each of its ligamentous connections. Fig. 1, *a*, Spermatic vessels, invested by muscular fibres which descend with them to the ovary (*O*); some of them enter the hilus accompanying its numerous spiral arteries; others pass on to the uterus, forming the utero-ovarian ligament. The external longitudinal muscular coat of the Fallopian tube seems partly derived from the uterine platysma ; so also the round ligament, which takes its fibres chiefly from the proper muscular coat of the uterus. The *broad ligaments* at their thinnest portion consist of two double layers—sero-muscular—united by a middle cellular almost aponeurotic stratum. Muscular fibres are specially apparent on the *posterior* layer, some of them being derived from the upper and back part of the vagina. The *utero-sacral ligaments* are the two horns of a crescentic muscular emanation from the back of the uterine cervix and platysma, with additional fibres from its vaginal attachments to each cornu. For the rest, as well remarked by Henle, the relations of the peritoneum with the pelvic organs above the pelvic plane exactly agree with the supposition that they were thrust upwards against its under surface in attaining their respective positions. *It may be added that these relations are never afterwards changed, except as the result of a disintegrating process, such as that attending phlegmonous formations.*

THE UTERUS.

The shape, dimensions, and structural appearance of the uterus are shown (Pl. XVII., Fig. 1), natural size, which is a transvere perpendicular section of it through its lateral borders. Its pelvic relations are seen one-half size (Pls. XII., XIII.). It is a conical body, somewhat flattened, tapering gently and regularly as far as its middle (*uterine body*), whence its sides continue nearly parallel to the smaller end (*uterine neck*). When moderately injected so as to restore the organ as near as may be to its normal condition, its outer surface is uniform, no sulcus line of demarcation between body and neck, notwithstanding the marked difference in the proportion and arrangement of their uterine elements; nor any of those surface depressions alleged to indicate its being habitually subject to mechanical compression during life from adjoining organs. It stands upright within the pelvis, between the bladder and rectum; its borders looking transversely; its surfaces front and back. The upper surface of its larger end is generally on a level with the plane of the pelvic inlet (never higher, oftener lower), about ¾ inch in front of the upper part of the sacrum. *The end of the cervix marks nearly the centre of the pelvic*

cavity—the centre of a general radius of about two inches. The uterine neck is maintained in this position under ordinary circumstances by the utero-iliac, utero-vaginal, and utero-cellular processes; the uterine body and appendages by the prolongations to the sides of the pelvis of its sero-muscular platysma, the uterine portion of which having covered the entire uterine body, passes as a double-fold to the *sacro-iliac articulation on each side* (Lateral or broad Ligament), except along the uterine borders, and at the point where the common iliac artery divides into the external and internal iliac arteries, the two folds above the sub-peritoneal pelvic plane are in intimate contact, a thin aponeurotic layer of connective tissue only intervening. At the pelvic plane they pass off before and beyond into the general pelvic peritoneal coverings. The relations of the Fallopian tube and ovary at the upper edge of the lateral ligament have been already noticed (Pl. XII.). Their motions are restrained by the fibres representing the *utero-ovarian ligament* continued on the spermatic vessels (Fig. 1 *a*), so as to act as a posterior round ligament (Rouget), and by the outer unoccupied portion of the free border which attaches the end of the tube to the pelvis (*Tubo-iliac ligament?*). Nearly all the platysma fibres in the anterior layer of the lateral ligament eventually pass into the anterior round ligament, the fibres of the posterior layer contract attachments with the pelvis. It is evident that except at its two attachments none of the vessels and nerves of the uterus are within the lateral ligament (Pls. VIII. and IX.).

The length of the virgin uterus is 2½ to 3 inches; breadth at the fundus between the entrances of the Fallopian tubes somewhat above 2 inches; breadth where the body joins the neck about 1 inch; thickness of walls about ½ an inch, that of the cervical walls a little less. The lateral outline of the uterine cavity corresponds in a measure with that at the borders. Its front and back surfaces are in apposition throughout, except, perhaps, at the isthmus, at the lower angle, and at the openings of Fallopian tubes. The cavity has therefore the shape of a triangle, each side about an inch in length. The cord-like Fallopian tubes pass *without loss of substance* through the uterine walls at their upper angles, their central filiform canal opening into the uterine cavity at its upper angles also. The cavity of the cervix is fusiform, about an inch in length, its diameter at its widest part about its middle ¾ inch; width at the isthmus, where the two cavities communicate without showing any line of demarcation, less than ¼ inch. The weight of the entire uterus is about 1½ ounces. After childbirth—after complete involution even—*these dimensions are permanently increased by about a fourth—in the vertical direction even by a third.*

The walls of the uterus are eminently muscular. Its fibres take the form of an inextricable interlacement—*a true muscular plexus*—differing in no way, except in the colossal size of the muscular framework, from that which is observable in erectile bodies of a lower class, where the blood-vessels, especially the veins, are in proportion immensely in excess

of the nutritive wants of the organ. The uterine walls are absolutely inseparable into layers or coats, and no sort of formula of arrangement of fibre, as in the case of the heart, is conceivable in respect to them. Without altogether departing from their plexiform character, the fibres at the inner and outer surfaces present a closer texture, and form a sort of internal and external though paler cortex, contrasting with the pre-eminently thick, red vascular erectile central portion—medulla.

THE UTERINE LINING MEMBRANE.

The lining Membrane of the Uterine Body is a glandular structure consisting of a fine branched cell connective tissue framework, sustaining—1, *Gland ducts* and their alveoli; 2, *Capillary networks ;* 3, *Lymph radicles ;* 4, *Glandular nerve endings* (Pflüger). The cellular and molecular elements are therefore—1, *Gland cells* lining the alveoli; 2, *Nucleated* columnar cells lining the ducts; 3, oblong or spindle *placoid* cells forming the walls of the capillaries; 4, Endothelial placoid cells forming the walls of the lymphatic radicles and lymph spaces;

Surface Section removing the Epithelium.

Fig. 17.

1, 1, Upper rings of Columnar Cells lining the Gland Ducts. 2, Space where the rings came away with the Epithelium, the ducts having no Basement Membrane. 3, Two Gland Ducts adjoining: they are generally segregated with some appearance of regularity, and separated by a trellis of Capillary Network. 4, A Capillary.

Uterine Ciliated Epithelium.

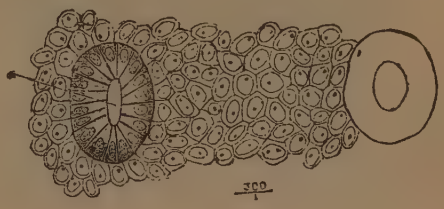

Fig. 18.

*, Orifice of Gland Duct, surrounded by a margin of Columnar Cells.

5, Stellate or fusiform connective tissue cells "similar to those of the framework of lymphoid organs" (Henle, Lindgren). 6, Ciliated cells of the epithelium. The whole permeated by protoplasmic amœboid molecules, which, by cell evolution, take the place of effete fixed cells, amongst others the gland cells, which are dying incessantly in the act of giving out their secretion.

The gland ducts and alveoli extend quite through the membrane (about $\frac{1}{25}$ inch in thickness) in the shape of hollow cylinders, straight, forked, curved, or even curled, so as to reach the muscular interstices, where their ends are embedded in the intermuscular connective tissue which is continuous with the connective intermuscular framework of rest of the uterus.

The lymph spaces or channels are traceable into the uterine intermuscular connective tissue framework of the uterine body. They eventually terminate in those lymphatics of the uterine surface which pass into the lymphatics of the broad ligament (Leopold). (Pl. XX.)

The Lining Membrane of the Cervix.—The connective tissue framework is of a much firmer character. The structural elements, on the whole, resemble those of the uterine body, but differ much in their proportion and arrangement. 1, each opposing antero-posterior surface is elevated into an ineffaceable stem with lateral processes (Arbor Vitæ) in regular succession with as many intermediate furrows, both more and more transverse the nearer they approach the labiæ. The whole surface, especially the furrows, are crowded with *Lacunæ*, some subdividing into blind prolongations after the manner of a simple racemose mucous gland.

Lymphatics and Lymph Spaces in the Uterine Glandular Mucous Membrane.

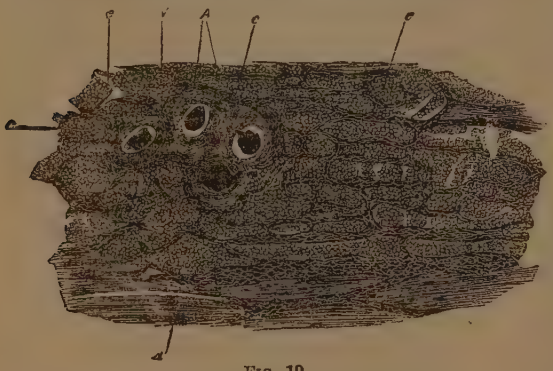

Fig. 19.

V, A, Section of blood-vessels. The dark lines indicate Lymph radicles (canaliculi). *a*, The same seen flatwise. *c*, Seen edgewise. *d*, Lymph radicles passing into lymph spaces (white lines). *Note* the lymph spaces surrounding the truncated vessels; the nucleated endothelial placoids lining the lymph radicles (they exist within the spaces also), and the protoplasm molecules in the ground substance of the Figure.

The Uterine Epithelium ceases to be ciliated at about the middle of the Cervix, but the gland tissue peculiarities of the uterine body cease at the Isthmus. Here the cervical lacunæ begin, and are apparent down to the os externum. Where the ciliated epithelium ends, pavement epithelium begins, and is continued on over the uterine labia throughout the vagina and vulva, in character approaching more and more as it descends to that of the epithelium of the external cutis.

Innumerable papillæ, each containing a vascular loop and covered with pavement epithelium, cover the genital tract up to that portion of the cervix where the ciliated epithelium ends, *and no further.*

The blood-vessels of the cervix differ from those of the uterine body—1, in their course; the larger, more or less flexuous, are not spiral. They terminate for the most part in sheaves of minute parallel branches forming loops with returning veins, each loop occupying a (generally filiform) papilla. 2, in the remarkable thickness of their coats. This peculiarity is well seen in surface sections contrasting with the open hollows of divided lacunæ. *In the labiæ where there are no glands of any sort, lacunar or otherwise*, the surface sections of these vessels have been mistaken for glands (Henle). 3, *Naboth ovule*—blind cystic elevations of the cer-

vical mucous membrane, occurring singly or in groups, particularly near the isthmus, often even on the inner surfaces of the labia, and where, apparently, they are nearly absent, are revealed in numbers by a perpendicular cut through the surface. They are filled with a transparent semi-colloid matter containing cytoid corpuscles, and are lined by cylindrical epithelial cells of unequal size. They are generally regarded as morbidly closed lacunæ. There is nothing whatever about them sustaining that supposition. 4. In the cervix the uterus at once loses the characters of an erectile organ. "Around the neck of the womb the fibres are arranged in transverse bundles, so as to form a regular sphincter uteri" (Frey, following Henle), a description most assuredly far from exact. The fibres of the sero-muscular platysma, are scarcely to be called uterine; where the uterine attachment of the vagina encircles the isthmus, superficial and extremely thin prolongations of its longitudinal fibres are continued onwards, *á*, to the utero-sacral ligaments; *b*, in the form of utero-median bands, front and back, which meet at the fundus; *c*, lateral fibres which join superficial *transverse uterine fibres* to form the muscular substratum of the lateral ligaments; fibres derived from this transverse layer are prolonged into posterior (spermatic) round ligaments. The anterior (round ligaments) derive still a thicker set from the same source. All these with the peritoneum constitute a true platysma, under which the uterine vessels, nerves, and lymphatics penetrate or pass out of the uterus. Under the platysma the muscular fibres of the uterine body interlace in all directions, at first inclining somewhat towards a longitudinal and transverse arrangement, but becoming more and more *plexiform* as they approach the inner surface. The uterine vessels are enclosed in rhomboidal interspaces, resulting from this interlacement. The thin coated veins, closely adherent through their scarcely perceptible connective tissue adventitiæ, have the appearance of mere tortuous channels in the uterine substance.

Palmæ Plicatæ, or Arbor Vitæ, a lateral half showing the ordinary conformation of the Stem and Processes. Black dots indicating the openings of the Lacunæ.

FIG. 20.

The vascular apertures on the outer cortex of the uterine body are very minute, the rhomboidal spaces reach their full extent on the uterine medulla; as they approach the inner cortex they become even smaller than those in the outer one. This arrangement seems to warrant the erectile character claimed for it originally by Rouget. All this is for the most part reversed in the cervix, where the *microscopic muscular longitudinal submucous stratum* in the uterine body is immensely thick-

ened, especially under the stem of the arbor vitæ. The medulla is no longer erectile. There the muscular fibres take an oblique and transverse direction, starting from the middle line front and back, and crossing one another at the bodies, bringing the two stems face to face, the front one to the right, the other to the left, the two thus mutually dovetailing. The outer longitudinal muscular fibres of the cervix, those which do not form a part of the vaginal attachment, intermixing with transverse fibres, expand into the labia. *The anterior labium is adherent to the vaginal fibres. The posterior is free of them nearly up to their uterine attachment at the isthmus.* Uterine nerves (Pl. XVI., text).

BLADDER AND URETHRA.

The female bladder when empty is situated low down in the pelvis, lower than in the male, between the uterus and pubis. It is somewhat egg-shaped when distended, *but round* when fully contracted, conformations resulting from its vital tonicity, not apparent in the dead subject. It reclines on the upper side of the vagina, to which it is connected by yielding cellular tissue as *far as the vaginal attachments to the uterus*—that is, nearly to the junction of the uterine body and neck. Under ordinary circumstances these relations are efficiently maintained by the lateral connections of the bladder with the utero-vaginal cellular processes, which are continuous with the cellular layer in the vesico-vaginal septum. When fully contracted, the peritoneal covering is scarcely raised, and forms neither a vesico-pubic nor vesico-uterine fold; these make their appearance only when the upper surface of the bladder rises, but however great the vesical distention, the *peritoneum never quits in the least its attachments to the uterine body, nor those it has with the abdominal or pelvic parietes.*

The thickness of the vesical walls depends on its muscular coat, and varies inversely as the distention—from two lines or less to half an inch or more. The outer fibres take a longitudinal, the inner a circular direction, crossing at various angles the two by reason of innumerable interchange of fibres acting as a single coat; the inner surface of the latter is thrown into reticulated projections, conspicuous in proportion to the amount of vesical contraction, disappearing altogether under the contrary extreme, by a submucous stratum of fibres continuous with the inner longitudinal fibres of the urethra.

The opening of the urethra into the bladder is in nowise funnel-shaped. There is left around them at their point of junction a triangular space, which is occupied by a dense ring of closely aggregated fine muscular fibres, by which these angular relations are preserved. This, the vesical sphincter, is at least a quarter of an inch thick at the angle of junction; posteriorly it gradually diminishes in thickness, its fibres at the same time assuming the character of the circular fibres of the bladder;

anteriorly, it quickly subsides into the commencement of the urethral sphincter (Guthrie's Muscle). (*Vide* Pl. II., Fig. 1, text.)

The female urethra is from an inch to an inch and a quarter in length, and nearly straight; its upper end inclines slightly backward, its lower end forwards; the canal taking approximately a sigmoid course. In the erect position, its vesical end is at the lowest part of the bladder, and its direction nearly downwards. The vulvar termination (meatus) is about four-fifths of an inch below the clitoris; its vesical end nearly the same distance behind the lower third of the pubic symphysis. The urethra is about an inch and a quarter long; allowing two inches and a half as the length of the urethro-vesico-vaginal septum, the anterior half of it is urethral. The anterior three-fourths of the urethra is inseparable from the vagina, but the cellular connections of the remainder, with the vagina, are more intimate than those between the latter and the base of the bladder. The coats of the urethra consist of an inner longitudinal thin, and an outer thick, circular layer. The latter, composed of inner circular and outer spiral fibres, completely surrounds the canal for more than the upper half of its length; below they are incomplete, and pass into the upper wall of the vagina. The lower three-fourths, or vaginal portion, is nearly half an inch thick, the upper fourth about a quarter of an inch. The circular and spiral fibres are compounded of organic and voluntary fibres, which make up for the upper half of the urethra a powerful compound sphincter muscle. The urethral or external sphincter, is, as already indicated, continuous with the inner or vesical sphincter, both acting in unison, the former resisting the hydrostatic pressure, the latter controlling the flow of urine. The inner layer of longitudinal fibres is continuous with those belonging to the inner reticular muscular surface of the bladder, but the outer longitudinal fibres of the bladder having attached themselves firmly all round to the outer surface of the vesical sphincter, pass on to their insertions—anteriorly, to the *arcus tendineus* (Luschka), Pl. XI., Fig. 2; laterally, to the rami of the pubis; behind, into the vagina, where they become identified with the urethra, leaving a space anteriorly and laterally, *urethro-pubic*, which is occupied by the urethro-pubic venous plexus.

THE LINING MEMBRANE OF THE FEMALE BLADDER AND URETHRA.

The lining membrane in the bladder consists of an epithelium and highly vascular cellular substratum, forming a thin but resisting structure, moulded upon and into the interstices of the inner reticular muscular surface, but so loosely attached as to be thrown into numerous projecting folds when the bladder contracts. It adheres more closely to the margin of the urethral opening and openings for the ureters, and that part of the base of the bladder intervening, but even there is easily detached by the knife. Neither papillæ nor glands of any sort have been clearly made out in it.

The lining membrane of the urethra, like that of the vagina, forms an integral whole with the rest of the urethral structures. The muscles entering into the formation of the female urethra and urethro-vaginal septum resemble in their vascular relations, but in a much higher degree, those observable in the lower half of the vagina. Their fibres are collocated into plexiform strands by an intervening cellulo-elastic tissue, so as to form intervening canals, having linings analogous to the inner coat of veins. The lining membrane of the urethra consists of an epithelium on a cellulo-elastic substratum, covering a *loose spongy structure occupied by veins*, which though of greater calibre than the above venous canals, are directly continuous with them. The arteries of supply run within the elastic sheaths of the muscular strands, and their communication with the canals resembles exactly that which occurs in the corpora cavernosa in the male (Henle). In the ordinary contracted condition of the urethra, the lining membrane lies in longitudinal folds, which disappear before any distending agency. Unlike the vesical lining membrane, it presents at its surface numerous papillæ and glands. The latter are perceptible as white puncta arranged in rows more or less parallel. They are lined by epithelium, and contain (many of them) a brownish concretion, similar to what is found in similar structures in the male prostate. Compare Pl. II.

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THE VAGINA.

The vagina is a musculo-membranous tube, remarkable for its *extreme dilatability;* its upper end surrounds and is strongly attached to the uterine cervix; its lower end is attached to the ischio-pubic rami. The muscular wall (external) of the vagina is not separable into coats or layers. Two-thirds of the thickness of the vagina, varying from 2—3 lines above to 5—6 below, is made up of this muscular portion; the inner third consists of a dense cellular lining membrane inseparably united to it. Elastic elements everywhere pervade this musculo-membranous structure, forming an enormously dilatable channel of communication between the external genitals and the uterus.

The length of the vagina is shortened through its relations with the ischio-pubic muscle and the perineal body (Pl. II., Figs. 1, 2), by which it is contracted into the form of a narrow ring at a short distance from its osseous attachments. The perineal septum is the result of this arrangement (Pl. II., Figs. 1, 2). The course of the muscular fibres is circular, spiral, and longitudinal, the latter being more apparent at its outer surface; some of these, more conspicuous than the rest near the vaginal ring, are the levatores vaginæ (Luschka) (Pl. X., Fig. 1). The posterior fold of the broad ligament derives a part of its muscular platysma from the upper and back part of the vagina where the surfaces pass off on each side, converging and ascending to meet the lower platysma fibres from the posterior surface of the uterus, also going into the broad ligament.

The uterine attachments of the vagina are entirely muscular. They surround the cervix, in the cortex of which they gradually lose themselves as far as the uterine body. This attachment commences in front sooner than behind, so that the posterior uterine labium projects more than the anterior one into the vaginal cavity. Some of the lateral vaginal fibres pass on into the utero-sacral ligaments. Externally the vagina and uterus appear continuous, no surface indication defining the limits of the above attachments.

The lining membrane of the vagina contains no secreting glands of any sort, but its entire surface presents numerous elevations, not merely a plicæ or rugæ, but as true membranous processes. The anterior columns commence immediately behind the urethro-vaginal tubercle, and run upwards along the middle of the anterior wall, gradually tapering till lost about half towards the cervix. There is a posterior column, generally less prominent, occupying a similar situation on the posterior wall. These, as well as the rest of the antero-posterior vaginal surfaces from end to end, are crossed by an irregular series of transverso-curvilinear ridges, inclining upwards as they approach the lateral borders, where they subside altogether or break up into minute tubercles. The columns, ridges, and the remainder of the surface, are studded more or less with similar elevations, inconstant and variable as to their forms, analogous in appearance to those seen on the upper surface of the tongue. As a rule all these processes are less numerous and prominent the nearer they approach the borders and upper portion of the vagina. Microscopic papillæ, on the contrary, abound everywhere under the vaginal epithelium. At the point where the muscular coat attaches itself to the uterine cervix, the lining membrane, divested of all processes, but retaining its papillæ and epithelium, passes on to the uterine labia to terminate abruptly at the margin of the external uterine os where the lining of the cervical cavity begins.

The columns (generally there are two anterior ones; they are otherwise exceedingly variable) and transverse processes at the lower half of the vagina share in the erectile distribution existing in that part of it and the urethra. The two columns—probably the transverse processes also—are not exactly opposed, permitting a kind of dovetail approximation of the antero-posterior surfaces, and so more effectually closing the vaginal canal. (*Vide* woodcut No. 1.)

RECTUM.

The pelvis, above the sub-peritoneal pelvic plane, is divided by the uterine body and its lateral ligaments into an anterior and posterior cavity, but not quite equally, since the inclination of the lateral ligaments tends to a point behind the median transverse line—that is, to their attachments at the sacro-iliac joints (Pls. XII., XIII.). The posterior cav-

ity is subdivided by the semilunar conformation of the utero-sacral ligaments into a retro-ovarian and a sacro-rectal portion, the latter being in fact a foramen, circumscribed by these ligaments in front and the sacrum behind, entirely occupied by the rectum. The sub-peritoneal portion of the rectum, usually, but not always, attached to the left side of the sacrum by an intervening fold of peritoneum, the meso-rectum, loses its peritoneal coat in passing through the recto-sacral foramen, descending first as the sacral, and lastly as the anal portion to end at the anus. The sub-peritoneal portion of the rectum, under ordinary circumstances, is separated from the uterine body by convolutions of small intestines, which usually fill the retro-ovarian space. The peritoneum descends more in front of the rectum than at the sides, forming the utero-rectal peritoneal fold—Pouch of Douglas—the only part of the peritoneum below the sub-peritoneal pelvic plane.

The *sacral portion* of the rectum lies in the hollow of the sacrum. The lower two inches is the *anal portion*, which turns back from the sacral portion at an angle, more or less, which generally corresponds with the first fold of Houston. This fold, springing from the right side and passing along the anterior surface, is occasionally ineffaceable. The rest (two more at most) are not so, being folds of all the intestinal coats, which is the case with the latter in the majority of instances.

The sacral portion of the rectum in the female, unlike that in the male, where it is spheroid, forms an ampulla or rectal sac, chiefly at the expense of the posterior parietes. Where the rectum is surrounded by the crescentic utero-sacral ligaments with which it has intimate muscular relations, there is often an aggregation of circular fibres continuous with the inner circular coat, but more resisting—*sphincter supérieur*—Nélaton.

The longitudinal muscular bands of the colon expand along the sigmoid flexure gradually into two, and at the commencement of the rectum into a single entire muscular coat of longitudinal fibres. These become thicker and stronger as they approach their anal terminations. The inner muscular fibres are circular. At the anal portion they form a strong muscular ring at least an inch and a half wide—the *inner sphincter*.

The mucous membrane of the rectum is remarkable for its loose texture, great vascularity, and the number and size of its glandular orifices, the latter giving the surface a sieve-like appearance; in the undisturbed state it lies in longitudinal folds projecting considerably into the rectal cavity. In the upper portion of the rectal sac their continuity is interrupted by folds in the contrary direction.

The columnæ recti (Morgagni) in the anal region are not mere membranous folds, but mucous processes sustained by sub-mucous muscular organic fibres loosely connected by a cellular tissue, which is abundantly permeated by nervous fibrils and vessels.

The rectal glands cease at the anal portion, which presents instead numerous papillæ.

The *recto-vaginal muscle* is a fleshy bundle derived from the anterior

part of the longitudinal muscular coat of the rectum a little above the anal portion; it is inserted, tendinous, into the posterior part of the vagina a little below its middle third.

Recto-coccygeus muscles—retractores—*recto*, arise, the two near together from the anterior surface of the second or third bone of the coccyx, inserted into the back of the rectum less than half an inch above its passage through the recto-vesical fascia.

The longitudinal muscular fibres of the rectum are not only firmly connected to the recto-vesical fascia, many fibres with elastic filaments in addition are continued on so as to be as firmly connected with the subcutaneous tissue immediately surrounding the anus.

PELVIC ERECTILE AND TURGESCENT STRUCTURES.

The Female Pelvis is especially remarkable for the number and variety of venous collocations, of which the veins serve other and very important purposes than as mere channels of transmission. The Clitoris and its crura are essentially erectile bodies; the Urethral, the Urethro-vaginal, Vagino-uterine and Uterine venous plexuses (Pls. VI., VII., IX.) are turgescent (*turgeo*, to swell). The Uterine body, the Bulb of the ovary, and Bulb of the vagina, are erecto-turgescent. The turgescent state of erectile bodies is a temporary state, the circulation in them except when invoked to erectile activity being of the ordinary character; turgescence, on the contrary, is the ordinary state of turgescent bodies. The uterine body, the bulb of the ovary, the bulb of the vagina, the lower half of the vagina, the urethra, are turgescent in the ordinary state, but share with the clitoris in the function of temporary erectility.

In structure these three orders of venous bodies are similar; a mesh composed of muscular, or cellulo-muscular tissue, forming angular spaces freely communicating with one another: the spaces in size vary from the calibre of a considerable vein to one almost that of a capillary. The long axes of the spaces take the direction of the long axes of the organ, representing altogether an enormous capillary, their analogous lining membrane exercising over the retarded blood a similar conservative power.

All erectile and turgescent structures possess special arteries; of which the distribution or conformation is peculiar and characteristic. The chief artery or arteries running along the centre divide suddenly into lateral primary branches, which immediately becoming tortuous subdivide into innumerable tufts of minute tendrils (clitoris and crura), or the main arteries becoming tortuous almost before reaching the organ rapidly subdivide into innumerable spirals (uterine body), or primary spiral branches are given off from one side of the main artery at some distance from the organ (ovary), or the main artery is merely tortuous as it meanders among the larger veins at the periphery (turgescent venous plexuses). In all cases the arterial distribution ramifies on and is sustained by the

muscular or musculo-membranous framework, and opens separately into the venous spaces at the apices of the angles necessarily resulting from the formation of each trabecular mesh. The size of the terminal arteriole varies from the calibre of a capillary to that nine or ten times greater. The question as to the existence of terminal vessels of the latter size has been settled definitively by the corroded preparations of Langer; the veins of the male corpus cavernosum were filled with an injection of one color, the arteries with one of another color; the spaces became filled with the venous injection; the bases of Valentine's conical terminations of the arteries were seen to be continuous with the spaces, and of course injected with the venous injection; their apices were continuous with the end of the arterioles plainly distinguishable through the contrast presented by the two injections. Valentine's cones in fact are the angles of the venous spaces, at the ends of which each arteriole directly opens.

The configuration of erectile and erecto-turgescent bodies is maintained by an outer cortex, a denser portion merely of the general structure wherein the spaces are smallest, and consequently the trabeculæ in closer approximation, presenting efferent venous perforations peculiar to each body. The turgescent bodies are sustained by their general musculo-membranous mesh, which, admitting of some distention, at once brings them back to their normal state on removal of the distending cause. During pregnancy the two latter bodies are in a state of unusual distention, in sympathetic parallelism with the vascular hyperplasm going on in the uterus. Physiological conditions effected through their extensive venous intra-communications and co-existing with the vitality of the germ; death of the latter and consequent subsidence of the attendant vital uterine-turgosis, is immediately followed by that in the rest of this venous system; the disappearance of the characteristic blue turgidity from the visible parts of the female generative organs being amongst the earliest signs of the accident.

PELVIC CONNECTIVE TISSUE.

The pelvic cellular tissue, as before observed, encloses the vagina and uterus, together with their vascular connections. In structure it is eminently fibro-elastic and muscular also, where it surrounds and constitutes the framework of the utero-vaginal vascular plexuses: so constituted, it forms an integral part of the uterine system, which may be conceived as having been thrust into the pelvis between the rectum and bladder, and there fixing itself by cellular attachments to every available part of the pelvic cavity. *The independence of this uterine collocation is exemplified in certain forms of pelvic sub-peritoneal abscesses of long standing, which leave unaffected from first to last the rectum, ureters, and bladder.* The uterine cellular system is continuous at its periphery, with every part of the sub-peritoneal cellular tissue at the lower part of the abdomen.

To determine the probable course of diffuse abscess in the pelvic cellular tissue, König injected into it at various points air or water; *a*, beneath the peritoneum, near the ovary or Fallopian tubes, the injection made its way along the psoas and iliacus muscles into the pelvis; *b*, beneath the lateral ligament, close to the upper and fore part of the cervix, it filled the same side of the pelvis, passed along the round ligament towards Poupart's ligament, and lastly to the iliac fossa; *c*, beneath the broad ligament near the upper part of the cervix but rather behind, it filled the posterior and lateral parts of the pelvis, afterwards passing along the psoas and iliacus muscles, and eventually into the pelvis (Hewitt); but the spread of matter has shown itself co-extensive with the cellular tissue: pelvic abscesses have burst or been opened (in the order of frequency): 1, in the iliac region; 2, above the pubis, nearly as high as the navel; 3, in the inguinal region; 4, by the side of the anus, probably through the ischiatic notch; 5, by the vagina; 6, by the rectum ; 7, into the bladder; 8, into the peritoneum. Purulent collections occur also between the bladder and uterine cervix, and between the vagina and rectum, as local suppurating phlegmons (Cases, p. 69).

PERITONEUM.

The relations of the Peritoneum are best understood by supposing an atrophic process to commence at the centre of a mass of loose connective tissue, and extending in all directions till arrested by the walls of the abdominal cavity (Henle) the result would be a closed sac coating the abdominal cavity and its contents, without disturbing their previous correlations. The free surface is covered by a nuclear pavement polygonal epithelium (Endothelium?), the fibres of the highly elastic connective tissue substratum arranging themselves in various forms—*e. g.*, felt-like, fenestrated, a framework sustaining blood-vessels, lymphatics in enormous proportion, a meshwork of medullated nerves, cells of smooth muscle more or less in most of the peritoneal duplicatures. The cellular elements are endothelial placoids lining the lymphatic channels, spindle-shaped placoids forming the capillaries, branch connective tissue cells, free molecules of protoplasm. The lymphatic channels communicate directly with the peritoneal cavity through innumerable pores; the endothelium being continuous from the general surface to that of the channels (Klein). In the case of the abdominal organs the peritoneum is a part of their construction, the elastic connective tissue substratum in direction conforming with that of the subjacent fibres of the organ.

Owing to the great elasticity of the Peritoneum, changes as to relation and dimension to an extent truly enormous, to which the abdominal viscera are liable, produce no corresponding alteration in its fixed attachments—*e. g.*, having secured the urethra, if the bladder be distended by fluid injections, through the ureters so as to imitate that which takes

place in the living body through extreme retention of urine, the bladder is seen to rise in the form of a regular ovoid as high as the umbilicus, but the pelvic peritoneal relations undergo no change; the vesico pubic subperitoneal space is not extended upwards, as generally supposed; the peritoneum still descends on the anterior parietes of the abdomen to an inch above the pubis. In complete procidentia of the uterus, or hypertrophic elongation of the cervix, there is complete inversion of the vagina; nevertheless, the utero-vesical and utero-rectal peritoneal folds maintain their former connections in their new situation. The bladder is invariably found within the inverted vaginal sac, and though the pelvic attachments of the rectum will permit no part of it but its anterior wall (and this not always) to enter the sac, the pouch of Douglas will still be found occupying the lowest place in it, behind still, and attached to, the cervix, the posterior layer and its continuation into the meso-rectum being, of course, greatly on the stretch. The utero-rectal pouch being attached to the cervix so low as the attachment of the vagina descends with it, but the utero-vesical fold not being attached beyond the uterine body, remains above the sac in cases of cervical elongation merely.

NEOPLASMS OF THE UTERINE SYSTEM.

Neoplasms in all forms nearly are to be found in the uterine system; whatever is conceivable in regard to their formation depends chiefly on the following propositions :—

The first step towards the production of every tissue, healthy or morbid, is the appearance of membraneless molecules, so-called cells, of protoplasm having amœboid movements.

The embryo at a certain period consists entirely of an assemblage of such living particles; primarily these are derived from the cleavages of the ovule, itself a cell, a process repeated in each of the resulting cells until the appearance of the vascular system, out of which similar particles—white blood-corpuscles in quantities make their way; whether, after this, cell cleavage still goes on, and, if so, how much subsequent tissue formation is due to one more than the other, is still unsettled.

The tissue first formed is the connective tissue. An embryonic cell is fundamentally round; the commencing embryonic tissue are such cells surrounded by albuminous matter; at later stages, the cell becomes elongated, then fusiform, and the intercellular substance fibrillated, whether or no through the splitting of the elongating end-processes of the cells is not determined.

Another form of *embryonic tissue* is the mucoid, where the intercellular substance is distended by interstitial mucin, by which the cell is drawn out into many processes, which are prolonged into the sepiments of the tissue.

The primordial embryonic cell to some extent enlarges with the grow-

ing tissue, presenting intermediate forms—oval, oblong, up to the fusiform or stellate or branched connective tissue cell.

The Giant cell, or Fœtal cell, is found in the Medulla of mature fœtuses.

The Gland utricle, the simplest of organs, is in its embryonic state merely a solid flask-shaped aggregation of cells.

Nomenclature has hitherto proved more a hindrance than a gain to pathology, so many of the terms in use implying groundless distinctions, or similarities inconsistent with the mixed or elementary characters of most neoplasms.

CLASSIFICATION OF NORMAL TISSUES. (FREY.)

A, Tissues composed of simple cells with fluid intermediate substance. 1, *Blood.* 2, *Lymph.* 3, *Chyle.*

B, Tissues composed of simple cells with a small amount of intercellular substance. 1, *Epithelium.* 2, *Nail.*

C, Tissues composed of simple or transformed cells (in some cases cohering) situated in homogeneous, sometimes fibrous, and, as a rule, more or less solid intermediate substance (*connective tissue group*). 1, *Cartilage tissue.* 2, *Colloid tissue.* 3, *Reticular connective substance.* 4, *Adipose tissue.* 5, *Connective tissue.* 6, *Bone tissue.* 7, *Dentine.*

D, Tissues composed of transformed and as a rule non-cohering cells, with scanty homogeneous and more or less solid intermediate substance. 1, *Enamel.* 2, *Lens.* 3, *Muscle.*

E, Composite Tissues. 1, *Nerve.* 2, *Gland.* 3, *Vessels.* 4, *Hairs.*

Embryonic tissue would be some one of the connective tissue group at a corresponding stage of development.

No neoplasm possesses an element not to be found in healthy tissues somewhere.

CLASSIFICATION OF NEOPLASMS.

(*Observed Localities in the Uterine System.*)

Tissue Imitations.—1, *Chondromata* (Cartilage); ovary. 2, *Colloid Myxoma* (Vitreous Humor); ovary, labia majora. 3, *Reticular* (lymph gland tissue); pelvic lymphomata. 4, *Lipomata* (adipose tissue); labia majora, and adjoining subcutaneous tissue. 5, *Fibromata* (hard connective tissue); vulva, uterus, ovary, vagina. 6, *Osteomata;* ovary, uterus. 7, *Dentine;* ovary (component of dermoid ovarian cyst).

Organ Imitations.—Adenoma; glandular mucous membrane of the uterus; ovary. *Lymph Adenoma;* pelvic lymphatic glands. *Angioma;* in every part of the uterine system. *Papilloma* (villous); in every part

of the uterine system, ovary included. *Lymph Angiomata;* pelvic lymphatic system. *Elephantiasis;* labia majora; skin coverings of the vulva, clitoris, mons veneris. *Trichomallomata,* fleece-like hair; dermoid ovarian cysts.

Sarcoma.—Imitations of embryonic or fœtal tissue. Embryonic cells of all descriptions in a framework of embryonic connective tissue in any of its varieties. Sarcomas vary, therefore, according to the character of their framework and size, shape and relative quantity of the cells—*e.g.*, encephaloid, giant-cell sarcoma, spindle-cell sarcoma, round-cell sarcoma, glio-sarcoma:—Uterus, ovary.

Carcinoma, Cancer.—Embryonic gland imitations at the earliest stage, in-growths crammed with embryonic cells of all sizes, and variously altered in shape by the compression of the connective tissue walls of the alveoli; the latter infiltrated in proportion to their vascularity with leucocytes; the connective tissue cells are also more or less embryonic—that is, no longer branched. *Speedy decay of the cells in the alveoli* (the analogous gland cells die, and partially dissolved come away with the secretion). In moist cancer the débris of partially dissolved dead cells are retained (cancer-juice) in the alveoli. In dry cancer they are found packed as concentric foliaceous agglomerations. This *cell necrosis*, like other dead or dying tissues, provokes reparative activities in parts adjoining, which are "infiltrated" with leucocytes; the latter soon, however, participate in this decay, becoming one of the sources—in some cases, the chief source of infection. In ulcerating or open cancer the new vessels of the cancer stroma, or parts adjacent, develope into unwholesome granulations (*Fungus Hæmatodes*):—Every part of the uterine system where there are glands. The vagina and Fallopian tubes (wherein there are no glands) are involved by leucocytic infiltration in the way above mentioned.

In regard to the question of malignancy, attended or not by *recurrens in loco eodem alalique*, the experienced surgeon decides without much reference to histology, and is generally right where the pure histologist is generally wrong. The greatest benignity and greatest malignity may be united in the sarcomata group. "I can assure you that two sarcomata of the most *similar histological qualities* may differ entirely in course" (Billroth).

The latest suggestion (Savory) is founded on the assumption that embryonic cells possess a longer sustainable vitality, so carrying with them to distant parts a living malignant agency, but a cancer cell is ever a decaying or dead cell; besides, such bodies could scarcely escape out of their alveoli, even if it be true that lymphatic radicles open into cancer alveoli (Cornil et Ranvier). Moreover, the same argument would apply to any embryonic cell-mass of protoplasm, cancer cells having no special embryonic character.

The possible transition of adenoma into cancer is sufficiently obvious.

Cystomata, Retention Cysts.—Cystic enlargement of glandular alveoli,

or of cavities glandular or not through occlusion of their outlets; glands of the vulva, urethra, uterus; cystic enlargements of uterus or Fallopian tube. *Distention cysts:* distention of follicles having no outlet. Ovarian follicular cyst: Naboth ovule. *Transformation cysts:* venous or lymphatic channels in uterine fibro-cystomata. *Neo cysts* in the substance of members of the connective-tissue group through morbid tissue softening or cleaving of the tissue—*e.g.*, Cysto-fibroma, cysto-chondroma, cysto-sarcoma, cysto-myoma. The cyst contents of the latter may be non-diffusible albuminoids in all forms—colloid, mucoid, serous, &c., variously colored by blood pigment; of the former, débris of gland epitheliums, and retained secretion variously altered and compounded:—Any part of the uro-genital system.

Tubercle.—Aggregations of embryonic leucocytes, prone to decay at the first stage of germination, not enclosed in alveoli, but tending like cancer to provoke abortive reparative action in surrounding tissues. To determine how much of the fatality ascribed to these two affections is due to the latter is a difficult matter. The doubt, at all events in the case of cancer, is considered to justify the removal of very much that is not cancerous.

Scirrhus.—Alveoli in a framework of hard and scarcely vascular connective tissue.

Encephaloid.—Dead and dying embryonic leucocytes in a reticular framework of delicate and highly vascular connective tissue. This form of sarcoma is of very rapid growth, through continual formation of new stroma and consequent migration of leucocytes into it.

TISSUE CHANGES SPECIALLY PROMINENT IN THE UTERINE SYSTEM.

Fibroma, Uterine.—Uterine fibromas are hyperplasms of the middle uterine substance converted into fibromas by the compression sooner or later exercised upon them by the outer or inner uterine cortex, or by both of them. They vary in size and shape according to the force and direction of this compressive action. The tissue change, therefore, commences at the surface. This is shown by the looser texture of some fibromas at the centre. The natural result is disappearance of the vascular spaces and the myosin of the muscular cells. The concentric arrangement of fibres, more apparent than real, around the punctiform remnants of these spaces is due to the compressive action of the surrounding normal tissue. The fibroma is now enclosed in a vascular capsule. This compressive power on the part of the uterus is never exhausted; the removal of large fibromas of old standing (enucleation) being quickly followed by uterine contraction more or less complete. This occurs also in cases of the smaller circumscribed fibromas within the cervix or labia.

The greater proportionate contractility of the outer uterine cortex

tends to project hard fibroids towards the uterine cavity, and weaken the resistance of the inner cortex.

Fibro-Myomata of the Uterus.—Subserous or submucous according as the outer or the inner cortex yields to the hyperplasm. In most of the latter the muscular cell has the embryonic spindle-cell form—spindle-cell sarcoma (Billroth). This polypus may be permeated by minute arteries and have its centre occupied by a venous plexus; the veins also of the uterine mucous membrane it carries before it may be much enlarged, the membrane itself much hypertrophied; or when at a later stage this form of fibroma has assumed the polypoid form the stalk may contain large veins and even arteries of large calibre.

Subserous Fibro-Myomata are of all sizes; when small they are usually very vascular, retaining the texture of the uterine substance but little changed, and of course bleeding obstinately when cut in proportion to their smallness. The larger subserous forms usually become cystic through cleavage of the tissue, or by distention of the venous or lymphatic spaces. Specimens of enormous size are met with nearly solid, or almost entirely cystic, or for the most part transformed into one huge cyst, easily mistaken for a huge cystic ovary. The cystic contents agree with the conformation above suggested.

Fibrous Uterus (diffuse connective-tissue hyperplasm of some authors).—A formation attended by atrophy of the other structures; when general the uterus loses its contractility (squatting uterus, Rigby), when partial leading to parturient rupture. I have twice passed inadvertently the uterine sound through such a uterus. I satisfied myself that the end of the sound, felt *too plainly* under the abdominal teguments near the umbilicus, did not find its way through the Fallopian tube, nor had carried the organ before it. The patients were not aware of the accident, and suffered nothing from it.

Uterine Hyperplasm.—The uterus, *including the cervix*, uniformly enlarged; the uterine and cervical cavities enlarged in proportion, the uterine texture red, rather soft and spongy; its shape resembling that of a healthy uterus in the unimpregnated state. A uterus presenting this tissue change was sent to me by the late Mr. Obré; the patient died from some disease not uterine. He had divined the character of the affection partly from local evidences, partly from the menstrual flux, which was regular, but almost menorrhagic. The patient had been under his observation for nearly a year.

Hyperplastic Elongation of the Cervix Uteri.—The uterine body retains its situation within the pelvis; the cervix grows downwards, sometimes protruding beyond the vaginal orifice. The relations between the elongated cervix in this situation and the rectum, fold of Douglas, and bladder *are precisely the same* as between those parts and the cervix of a prolapsed uterus, for which it is so easily mistaken. In this respect elongations of the pars vaginalis present important contrasts; the latter, moreover, are for the most part fibroids, and may obviously be dealt with

in ways utterly inadmissible in cases of the first-named variety. The supra-vaginal elongation, it should not be forgotten, is a true hyperplasm of *all* the cervical structures.

Multiple Uterine Fibro-Myomata, Submucous.—As many as five have been met with. Their liability to recurrence may be due to their imperfect removal. *Subserous*, of all sizes and shapes, sessile or pediculated. The variety in this respect is simply interminable and quite beyond description. The latter are subject to calcareous degeneration of a peculiar kind.

Uterine Tumors give rise to numerous *uterine* deformities and *displacements;* of these the following perhaps are the least self-evident. *Retro-uterine*, liable to be mistaken for simple retroversion or retroflexion of the uterus; *Lateral*, projecting between the folds of the lateral ligament, and when cystic may be mistaken for intra-ligamentous cysts; *Labial* may be mistaken for cervical polypoid fibromas: a hard cervical fibroma may extend into the substance of the uterine labia, and be spontaneously enucleated through a small incision into the labium (Greenhalgh). Some subserous and intra-parietal fibroids are attended with elevation of the uterus out of the pelvis, producing great lengthening with attenuation of the cervix, without much displacement of the vaginal portion, or the uterine body may come to be actually separated from the uterus, the channel nevertheless maintained through an adventitious ligamentous structure (Virchow, quoting a case reported by Times). The uterine body may be twisted round on the axis of the cervix, bringing one tube over to the other, followed by adhesions between the two. One of the corners of the uterus may be drawn up, so much so as to bring the corresponding tube into a direct line with the uterine cavity; in the latter case the sound, so it is alleged, may find for itself an easy passage through the tube as far as the umbilicus. The fibroid may twist itself off from its uterine connections and be sustained through its adhesions to some abdominal organ or some part of the abdominal cavity. Occasionally enormous uterine subserous cystic fibro-myomata contract adhesions with the liver, their uterine attachments being so insignificant as to render it difficult to determine which is the true pedicle. Submucous fibro-myomas attached to the fundus often produce uterine inversion more or less; in rare cases such tumors are hollow, the lining of the cavity resembling the peritoneal surface of the uterus. My ignorance as to the possibility of this form of polypus in one case caused me much groundless apprehension that part of the inverted uterus had been cut away with the polypus.

In some forms of cervical hyperplasm the Naboth ovules are ruptured and drawn out into tubular lengths, running into one another, the *channelled Polypus* (Oldham).

Uterine Adenomata.—Hyperplasm of the connective tissue framework of the lining membrane with enlargement of the gland ducts and gland alveoli. When the latter predominate the tumor has a vesicular

appearance. The epithelium of the ducts and alveoli may accumulate within them, the structure so passing into true cancer, or the vascular connective tissue framework may become infiltrated with leucocytes and soften, and thus be transformed into encephaloid. The change may affect the ducts and alveoli singly; solitary or multiple forms of this sort projecting from the uterine surface are not uncommon.

Papillo-glandular Uterine Hyperplasm (Cauliflower excrescence), of which there are many varieties. Cauliflower excrescence commences as a papillar adenoma, in which is concerned papillæ lacunæ, Naboth ovules, and connective tissue framework. The disease commences necessarily in the lower half of the cervical cavity (the papillary portion); the result is a quickly growing hyperplasm protruding from the outer os into the vagina, where, no longer controlled by the cervix, it expands so as to occupy in extreme cases no inconsiderable part of the pelvic cavity; its texture, size of its lobules, vascularity and consistence generally, depend on the relative proportion of the constituents above-named and the thickness of the epithelial coverings of the lobules. If cancerous, as it sometimes is from the commencement, it sooner or later becomes a papillary fungus, bleeding freely. Cauliflower excrescence is of all forms between a cystic friable agglomeration sustained by a delicate connective tissue framework and a brittle nodulated mass, wherein the cystic character is less apparent; few of the non-cancerous are apt to bleed unless torn, some of them not freely even then. I have broken off in large fragments some of the largest of the cauliflower type quite up to their cervical connections, with scarcely any hæmorrhage. In most forms there is a constant oozing of watery discharge, variously colored, generally in large quantities. This is derived probably from cystic rupture or exudation, or from the œdematous tissue framework, or in consequence of epithelial changes, one or all. This exudation would seem to go on after death, since cauliflower excrescences are then found notably diminished; of some scarcely more than a few loose shreds of tissue remain.

Papillary growths are frequent accompaniments of neoplasms wherever situated. They are met with generally in the form of villous vascular tufts, vascular vegetations, vascular fringes, prone to bleed in proportion to the thinness of their epithelial coverings. Such growths are common everywhere along the uro-genital tract, generally indicating some deeper-seated morbid action, and thus are scarcely worthy of the special name *Papillomata*. Of this kind are the intra- and extra-papillomata of cystic ovaries, intra-uterine, rectal, and vesical forms, the latter especially causing wasting hæmorrhages, without being complicated by cancer; or they are mere papillary exaggerations, minute red punctiform or granular eminences, in any part of the uterine system where there are papilla—*e. g.*, vulva, vagina, lower half of the cervical canal, labia uterinæ, the latter appearing as red halos round the os uteri, distended perhaps by one or more cystic Naboth ovules, or larger button-like growths, or fungoid villous masses, shooting forth from some part of the cervical cavity. Con-

nective tissue is a large component of most of the latter, so much so, that some of them suggest the idea of commencing cauliflower excrescence. These growths are generally denuded of epithelium, or it is shed as soon as formed. The discharges consist of leucocytes and serous exudations out of the blood-vessels, purulent in proportion to the former.

Fibro-Sarcomata.—In the form of nodules of connective tissue sparingly vascular. Unlike papillomata, they are tolerably firm to the touch, are covered by mucous membrane, which is sensitive in some cases, but otherwise healthy. Their usual locations are the margin of the vaginal aperture, os uteri, urinary meatus. The vulva is sometimes beset with them in the shape of irregular, tongue-like appendages. In many instances these growths are recurrent.

Many of the so-called uterine cystic polypi are connective tissue growths, involving at their commencement one or more of the uterine glands. The cystic character soon disappears. They grow rapidly, expanding in the direction of the least resistance, their shape and size varying accordingly. When not sessile, the pedicle is the combined result of uterine pressure and weight of the tumor, chiefly the latter. These muco-connective-tissue polypi are continuous with the submucous uterine cortex, in this respect differing from the uterine fibroid whose origin is intra-parietal.

Long pendulous polypi of the same kind occasionally grow from the labia majora. Forms of all sizes springing from all quarters of the uterine and cervical cavities are met with.

Angiomata of the Uterine System, from the incompressible cavernous forms down to the soft yielding varix (page 33).—Cavernous transmutation of some part of the intra-parietal structure of the uterus. Hæmorrhoidal growths (incompressible) at the uterine os or the urethral meatus; compressible turgescent angiomas, chiefly of veins at the uterine os: —Various parts of the vagina, especially the lower third ; also within the urethra, extending even from the meatus to the bladder; hard venous angioma in the urethro-vaginal septum, involving the anterior columns of the vagina, and projecting into the vestibule in the form of blue tumefaction scarcely compressible. Venous varix of the labia majora. Venous angioma of bulb of the vagina projecting into and separating the layers of the nymphæ. Varicocele (pelvic) of any of the venous plexuses, those not perceptible in the vagina, betraying their existence by a peculiar sensation of weight and discomfort in the erect posture, often attributed to some uterine affection.

Lymph Angiomata, without elephantiasis, in the upper part of the thigh and pubic regions. Dilated meandering lymphatics, with here and there nodules of lymph angioma, analogous to some compressible forms of bloodvessel angiomata.

Elephantiasis, with or without lymph angioma.—Tegumentary pendulous hypertrophy of the labia majora and minora, and prepuce of the clitoris; also non-pendulous tegumentary hypertrophy of the perineal and

adjacent tegument, extending up to the umbilicus, and far down the front of the thigh, associated with dilatation of lymph spaces and lymphatic vessels, thickening of connective tissue, pervaded by lymph-like fluids.

Myxomata.—Muco-colloid growths resembling the inter-tegumentary mucous connective tissue of the labia majora, sometimes polypoid, projecting from their inner surfaces.

Lipoma.—Encysted fat transformations of the myxoid tissue of the labia majora; diffuse fatty hypertrophy of the sub-tegumentary fatty tissue of the labia and perineum, as well as the mons veneris. The mass of coarse fatty tissue occupying the ischio-rectal fossæ is not subject to hypertrophy (Pl. III.).

Ulcerations—the separation of the dead parts from the living, whose vitality, altered or deficient, is unequal to tissue-reproduction.

Cancerous ulceration (rodent) of the uterus, particularly the uterine cervix, involving the bladder and rectum, also of the vulva. Rodent ulceration of the same parts not cancerous. *Excavating* ulcer, progressive tissue necrosis (diminutive cold abscess, Billroth). The cervix uteri is its special locality, the leucocytic infiltration of the tissues next to suffer, come away instead of applying themselves in the ordinary way to the formation of new tissue. *Catarrhal ulcer* of the uterine mucous membrane, rarely attended by much if any tissue loss except of the epithelium, leaving a fine or coarse granular surface, the granulations in the latter case looking like papillary vegetations. The discharges in all cases of true ulceration are leucocytic—that is, purulent. The so-called "whites" are products of hyper-secretory uterine glands, with débris of gland cells, which as usual burst in giving out their secretions; the mucous membrane or swollen part of it may protrude at the os, surrounded possibly by a halo of fine papillæ; this condition is liable to be mistaken for that of ulceration. There being no glands in the vagina, there is no such thing as *vaginal leucorrhœa.* Vaginal discharges are more or less purulent, consisting of leucocytes and serous exudation, accompanied by shedding of epitheliums. The thick tenacious mucosities occasionally met with in the vagina are uterine, the vaginal epitheliums entangled in them and partially dissolved adding to their tenacity.

Pelvic Thrombosis.

Clots obstructing any of the pelvic veins. The end of the clot projecting into the next communicating vein has deposited upon it in succession by the blood stream fibrinous layers, which (secondary thrombi) are detached in fragments; these find their way through the right side of the heart into the pulmonary arteries; the result is now well understood as pulmonary embolism.

Carcinoma, Sarcoma, Epithelioma of the Uterine System.

Epithelioma, a term ill-chosen if intended to indicate exclusively carcinomatous gland-tissue changes in secreting surfaces. The gland-tubules, or acini, or both, appearing to grow inwards, are transformed into alveoli packed with epitheliums. Epithelioma is common in any part of the genital tract where there are glands. In strict accordance with histological definitions lately propounded, all carcinomas must be regarded as epitheliomas, and carcinoma, in the uterine system at all events, is never too far away from gland-tissue to entirely shut out that assumption. The uterine body is the only part about which there can be any doubt; has there ever been seen there true carcinomatous tissue-change which did not commence at the inner surface of the uterine cavity? Some uterine subserous sarcoma nodules, especially those infiltrated with leucocytes, have an alveolar appearance, these bodies having accumulated within tissue interspaces, which are filled with them but devoid of epitheliums, moreover the connective tissue framework of carcinoma, besides the loss of all trace of its branched cells, derives peculiarities from the alveolar formation.

Sebaceous epithelioma of the vulva is attended usually with much suffering (Pl. X., Nerve-endings). In gland epithelioma of the uterine lining membrane the suffering usually comes on with the matting of surrounding tissues together, this increasing with the subsequent tissue destruction. In scirrhus forms the connective tissue framework is more profoundly altered and condensed. When soft, vascular, and infiltrated with leucocytes the form is that of *encephaloid*. In colloid the alveoli are filled with colloid matter through cell transmutation, the stroma still losing its branched cells, contrasting in this single particular with non-carcinomatous colloid or myxoid tissue. Whether or no, or how much of the essence of carcinoma may lie in original connective-tissue changes rather than in "disorderly heaps," of dead or dying epitheliums in alveoli is still an open question. Many of the larger forms of uterine carcinomata are carcinomatous adenomata.

Tubercle.—Molecular protoplasm leucocytes prone to decay at an early stage of the so-called cell germination. The entire peritoneal surface may be covered with such bodies. The alleged tuberculization of the uterine lining membrane is very doubtful.

Dysmenorrhœal Membranes.

An early decidua is a general tissue enlargement of the mucous membrane of the uterus, which swells up into a tender spongy tissue, chiefly through the expansion of its vessels, lymph spaces, and glands. The openings of the latter are now visible to the naked eye; there has been

no hyperplasia, scarcely any hypertrophy, the only tissue change being a transmutation of ciliated *epitheliums into placoids.* This alteration is limited to the cavity of the uterine body, the lining membrane of the cervical cavity taking no part in it, but contrasting by its paleness with the red hyperæmic condition of the former.

The outer surface has a rough, torn look, marked by nodular elevations and openings, the latter representing gland-tubules torn across, the former the cæcal gland-endings, which have come away entire.

The dysmenorrhœal membrane or cast is a decidua at a lower stage of development. Under ordinary circumstances, the uterine mucous epithelium comes away in shreds with the menstrual blood, which is arterial and highly coagulable, but losing the latter quality, and having its color altered by intermixing with the acid vaginal exudations.

The precursory enlargement of the uterus, and with this of course that of the cavity, is owing solely to the hyperæmic state of its vessels; in the course of subsequent contraction the uterine surface withdraws itself from the cast. On the surface of the partially denuded cavity there is seen what remains behind—that is, ends of torn glands, vessels, and lymphatics, and the remainder of the connective framework of the membrane, which, like the vessels and lymphatics, is continuous with the same structures in the uterine substance. With this reserve only can a decidua be said to be thrown off entirely. The cast is obviously from the beginning a source of obstruction, the more so after its detachment. The absence of ciliated epithelium is accounted for by the cell transmutation above mentioned. This may possibly not occur where the cast is merely epithelial.

Cysts of the Uterine System.

Applying the before-mentioned generalities concerning cystic formation, cysts incidental to this system require but little further notice. One or many cystic Naboth ovules may protrude into the area of the uterine cervix from the isthmus to the uterine os, or on the surface of the non-glandular labia uterina. Glandular cysts of the uterine body show themselves as minute elevations, or as minute cystic polyps, sessile, or with filiform pedicles, descending sometimes far into the cervix; or as larger bodies of the same character composed of many adjoining cystic glands, resulting in a compound mucous polyp, in size corresponding to the number of glands involved. *Inward* uterine glandular cysts are often found in groups enclosed in and covered by the mucous membrane more or less altered, forming true *Uterine Molluscums.* These uterine, follicular productions are analogous to certain follicular affections of the skin—*e.g.*, Miliaria, Acrocordon, and Cutaneous Molluscum.

Acne Indurata Colli Uteri (Virchow).—The labia uterina changed into hard mushroom-shaped tumefactions, studded with numerous Naboth ovules filled with mucus or pus.

Endometritis Chronica Cystica Polyposa.—Funnel-shaped dilatation of the os and cervix uteri, remarkable tumefaction of both labia uterina, numerous Naboth ovules single and in groups; higher up within the cervix, hypertrophy of the arbor vitæ and processes, which project considerably, and are studded with rows of follicular polyps, sessile and pedicuated; several follicular cysts near the isthmus; still higher up dilatation of the uterus, which had been full of fluid (occlusion at the isthmus), its mucous covering glazed; near the isthmus a large molluscum; another small one near the Fallopian openings; small molluscums deeply sunk beneath the uterine lining membrane disclosed by the section which laid open the uterine cavity (Virchow's collection).

The uterine mucous membrane entire may be transformed into a cystic adenoma, the possible transition of which into cancer has been already noticed.

Cysts of one or more of the urethral glands may project at the urethro-vaginal vestibule. Cysts of Bartholini's gland of limited magnitude occupy the base of the labia majora. The size of these glands is seldom the same on both sides. The cyst generally occurs in the largest. Larger labial cysts are not glandular.

Small flask-shaped cysts imbedded in the labia are distention cysts of the sebaceous follicles. Very large vaginal cysts are met with near the vaginal aperture where the tissues are erectile; they are probably erectile cyst transformations, of which many examples elsewhere are on record. Vaginal cysts higher up may be separation cysts, or originating from cystic cell vacuolation, referred to below. Subserous cysts of the broad ligament probably arise in this way; those in the neighborhood of the ovary have been taken for extension cysts of the parovarium (?), one or more tubules of which it is alleged, may develop into cysts of enormous size (Bantock).

Uterine Cystic Myoma.—Cystic dilatations of the venous or lymphatic channels in subserous fibro-myomas, already noticed, are scarcely distinguishable one from the other, the endothelium of vein or lymphatic having for the most part lost their special characters; the fluid contents of the cysts being the same in both instances.

The uterus, Fallopian tubes, and vagina, through obstruction of their end openings, have been ranged in the cystic catalogue—for that matter so might be the bladder.

Ovarian Cystomata.

The tissues of the ovary obviously abound in elements prone to cystic formations. 1. Cystic transmutation of one or more follicles more or less mature, each containing an ovule. At a later stage the ovule disappears, the cyst wall is confounded with the outer connective tissue zone of the ovary, which greatly thickened and highly vascular, or the contrary, con-

stitute the cyst wall. 2. The cyst is multilocular, composed of many cystic follicles, or if unilocular shows indications of cyst coalescence by dissepiments more or less perfect. 3. The cyst is multilocular by invagination; the primary larger cyst has not effaced the follicular zone, the follicles of which, becoming cystic, project as *secondary* cysts into its interior, pushing before them the wall of the former; in the same way tertiary cysts come to project into the secondary ones. 4. Vascular papillæ project from the inner surface of the primary cyst in the form of single or branched villi which, becoming cystic, appear as botryoid or polypoid pendulous cysts, much smaller than the last-named variety. 5. The cyst is multilocular, many or all of the secondary cysts projecting at the outer surface of the cystic ovary. 6. The cyst is neocystic. The ovary may have been transmuted into one of the connective tissue series —fibrous, bony, cartilaginous—which become cystic by interior softening processes, so called, at present not explained. 7. A part or all of the inner cyst wall is dermoid, furnished with hair-bulbs, and their sebaceous glands; the cyst being occupied by rolled-up masses of woolly hair, occasionally of great length, sebaceous matter, and containing teeth and bone

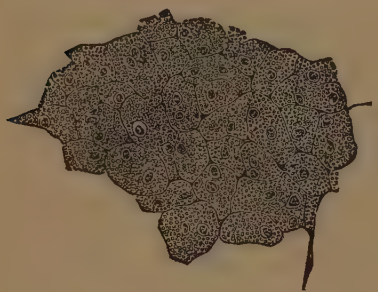


FIG. 21.

Section of multinuclear Giant-cell tissue surrounding some of the smaller Ovarian Cysts, Vacuolation commencing around the nuclei, eventually forming a vast network of large vacuoles or spaces which as the nuclei disappear become filled with granular matter (protoplasm?). When the large cells are torn apart single nucleated cells of the connective tissue framework are occasionally left projecting (K. Thornton).

FIG. 22.

Stage more advanced of Giant-cell. Vacuolation as seen occasionally in tissues surrounding Ovarian Tumors. A group of microscopic cysts, each lined by its membrane, partly detached by the hardening process employed in the preparation and so rendered more evident (K. Thornton).

of true dental and osseous structure—random imitations of maxillæ. 8. The tissue change at first is a gland adenoma (Wells), liable to pass eventually into carcinoma. 9. Much of the ovarian tissue may be changed by cell transmutation into colloid tissue, a radiating cone-like development of connective tissue (Wells), containing colloid or mycoid matter, not to be confounded with colloid cancer, the trabeculæ of which are devoid of the distinguishing connective tissue branched cells.

The *Contents of Cysts* vary naturally according to the character of the cyst:—Serosities clear or thickened by the débris of dead secreting cells, in the case of ducts, glands, follicles, or hollow secreting organs; albuminoids varying in thickness and tenacity in cysts resulting from the

supposed softening process, and colored by blood pigment, or containing when the cyst wall is vascular, protoplasm in the form of leucocysts having amœboid movements, or dead leucocytic agglomerations; such bodies as well as signet-ring vacuoles are common in colloid matters. Every cyst is more or less a dialyzer, retaining the non-saline albuminoids, allowing the salines to escape (Graham's law).

Cases.

Erectile Thrombus of the Uterus.

1 Case: A robust country woman in her seventh pregnancy; breech presentation, easy labor, female child, evidently for some time dead; placenta expelled ten minutes afterwards, no hæmorrhage or untoward symptom for the first three days. On the fourth day violent hæmorrhage; death from exhaustion in three hours. On the left side of the cervix about an inch from the os uteri a rugged, sloughy opening communicating with a cavity the size of a small orange, filled with loose clots, not in laminated coagula, and opening into the sac five or six blood vessels, large enough to admit a small bougie.

2 Case: Age 25; third child; hand presentation; delivery by turning without difficulty; placenta expelled quickly by natural efforts; patient recovering well after the fourth day. Copious flooding on the eighth day: death on the 18th.—Near the uterine neck on the left side and between the folds of broad ligament a sac partly filled with bloody pus, communicating by a large aperture with the cavity of the uterus. The opening had the appearance of a deep excavation or ulceration, readily admitting two fingers.

3 Case: Varicose veins in the lower extremity traceable into the vagina. Labor natural and favorable. Shortly afterwards a "fearful rush" of blood very unexpectedly, inasmuch as the uterus had contracted perfectly. Alarming prostration, patient almost pulseless for hours, the uterus continuing all the while perfectly contracted. In the situation of the anterior lip its substance felt as if broken up into a soft pulp, the consequence apparently of the formation and rupture of a labial thrombus.

Pelvic Abscess.

Some recorded Forms and Localities.—1. A hard circumscribed tumor on the left hypogastric and left iliac regions, extending as low as Poupart's ligament, eventually increasing and becoming more prominent above the pubis at the median line, where it was opened with an escape of a large quantity of matter.

2. A painful swelling to the left of the pubis, which slowly extended to the other side; slow increase of swelling towards the navel; it was

opened midway between the navel and pubis, giving exit to a considerable quantity of matter.

3. Pain in the left groin; some swelling and hardness above Poupart's ligament; forced flexion of the thigh; slow increase of swelling, which gets more and more prominent, especially outside the saphenic opening. Opened in the latter situation. Escape of about six ounces of matter.

4. Pain in the lower part of the back and escape of pus by the rectum; no tumor perceptible by external examination on the pelvic region. A considerable swelling felt per vaginam behind the left side of the uterine cervix. Uterus immovable, occasional considerable discharges of pus per rectum; afterwards hardness and fulness to the right of the anus, and eventually there a dense fluctuation. A large opening made by the side of the anus; profuse discharge of pus, rapid subsidence of the swellings and morbid symptoms.

5. A well-defined tumor low down on the right iliac region; fulness and tenderness at the right side of the vagina; uterus pushed towards the left side; escape of pus by the rectum; slow subsidence of the tumor.

6. A large, hard, and tender swelling on the left upper inguinal region; uterus fixed, and some hardness and tenderness in front of, and at the left of, the cervix; dysentery, with appearance of pus in the evacuations; rapid disappearance of the tumor; death from irrepressible dysentery, consequent on the bursting of the abscess in the lower colon.

7. A similar case; death, also, from dysentery set up by the frequent discharge through an opening into the rectum.

8. A large, hard, well-defined tumor on the right iliac region, extending to the median line and above the crest of the ilium; sudden copious discharge of pus from the vagina; quick subsidence of the tumor and rapid recovery.

9. A tender tumor immediately above the pubis; uterus fixed; morbid sensibility and hardness in front of, and immediately above, the cervix; appearance of pus from the vagina: slow, but continued discharge for months; gradual subsidence of the tumor; slow recovery.

10. A very painful tumor in the supra-pubic region; swelling and hardness in the upper and anterior wall of the vagina, pushing the cervix considerably backwards; appearance of blood and pus in the urine: quick disappearance of the tumor; rapid recovery.

11. Tumor behind the pubes, on the left side; at the end of several weeks, purulent discharge from the bladder; continuing for twelve months, with great irritability of the bladder and vesical tenesmus; eventual recovery.

12. Hard, tender tumor in the left pubic region; great reduction of it after leeching; but soon afterwards, deep-seated hardness and tenderness in the right inguinal region, which slowly increased into a tumor of large size, extending deeply into the pelvis, and causing semiflexion of the right thigh; softening in the iliac region; puncture there; immediate escape of twenty ounces of pus; recovery.

13. Tumor in the right iliac region, causing enlargement of the abdomen equal to that of a five months' pregnancy; os uteri low in the vagina and inclined to the right side; uterine body inclined towards the opposite side; discharge of a small quantity of matter by tapping; death. An enormous abscess originating in the cellular tissue between vagina and rectum, and opening into the peritoneum.

14. Large uterine fibroid; hardness and tenderness in the left iliac region; sudden pain in the lower part of the abdomen on the left side; severe peritonitis; death. A large abscess in the left broad ligament had made its way into the peritoneum.

15. Uterine fibroid; a painful swelling of considerable size in the left iliac region; discharge per rectum of an immense quantity of pus and subsidence of the tumor; refilling of the abscess, which now burst externally at a point corresponding to the inner ring.

16. Uterine polypus; removal by ligature; rigor and pain in the left iliac region; sudden violent pain in the abdomen, with vomiting; collapse; death. A large abscess on the left broad ligament, which had burrowed across behind the uterus to the right side, and burst into the recto-uterine peritoneal pouch.

17. Uterine polypus; ligature; hardness and tumefaction deeply in the right iliac region, rapidly followed by similar indications in the left iliac region; death from sinking. In each iliac region a globular tumor, closely connected with the uterus, rectum, and adjacent parts; each contained a quantity of yellow, inodorous pus.

18. Pain and swelling in the left iliac region; in a few days extending toward the middle line, eventually rising to within an inch of the umbilicus. Uterus borne upwards and fixed; sense of fluctuation to the finger carried to the upper and back part of the vagina; tapping at the latter point; immediate escape of twelve ounces of brownish serum, with a small quantity of pus; succeeded next day by a discharge of unmixed pus, which continued to come away in uninterrupted and intolerably fetid gushes, daily, for three months after the operation; great emaciation and prostration; eventual recovery.

19. Pain and swelling deep in the left iliac region; uterus fixed high up in the pelvis; intense hardness, perceptible to the finger, sweeping round the vaginal cervix; obscure sensation of softening at the back of the vagina; tapping at that point; exit of brownish serum, no indications of pus; subsequent discharge from the opening of intolerably fetid pus; closure of the opening with renewal of constitutional symptoms; a drainage tube introduced through the puncture and brought out an inch below; reappearance of fetid discharge, which continued uninterruptedly (slowly diminishing in quantity) for some weeks; recovery.

20. Pain deep within the pelvis; tenderness on pressure over the iliac regions and above the pubis. Uterus fixed high up in the pelvis; tenderness and tumefaction around the vaginal cervix, especially in front next the bladder; puncture made; escape of brownish serum with some pus;

followed the next day by more pus and a fluid smelling like urine; increase of swelling over the left iliac region. Pus now appeared in the urine and in the stools, pointing externally at the inguinal region, and subsequent bursting of the abscess there. No urinous odor afterwards.

Uterine Prolapse and Inversion.

Complete Inversion of the Vagina is associated with complete prolapsus of the uterus or with hypertrophic elongation of supra-vaginal cervix. With complete prolapse of the uterus there is complete prolapse of the bladder, but not of the rectum, which remains altogether, or at least at its upper two-thirds, unaffected, owing to the laxity of its intro-cellular attachments with the vagina and its closer relations with the pelvis above the utero-sacral ligaments. The anterior wall, at its lower third, above the inner sphincter, not below, as has been already indicated, being more intimately connected to the corresponding part of the vagina, occasionally forms a part of the contents of the inverted vaginal sac. The utero-sacral ligaments are elongated and put greatly on the stretch, still leaving undisturbed the upper part of the rectum, the intermuscular connection between the two notwithstanding. The contents of the alar mesentery or ligament—viz., the ovary and Fallopian tubes, except the uterine ends of the latter—do not usually follow the uterus; this is prevented by the form of attachment to the pelvis of the posterior layer of the broad ligament, in which they are involved. The perineal body is necessarily distended and attenuated, the perineal septum and vaginal ring, or vaginal aperture, effaced; the vagina can be traced direct to its attachment to the rami of the pubis and ischium, which would scarcely resist the strain of the hernia, were it not for the recto-vesical fascia (superior pelvic aponeurosis). (Pls. XVIII., XIX. Figs. 2, 3.) The forcible separation of the pubo-coccygeus muscles (anterior fibres of the levator ani), of course, attends the effacement of the septum and vaginal aperture. On the whole, the alteration, as far as regards the perineum, may be said to represent in a chronic state the changes attending the last stage of parturition. The urethra at first makes a curve round the back part of the urethro-vaginal tubercle, eventually pressing the latter forwards, and almost effacing it, in taking its new direction downwards and forwards.

Other anatomical changes of importance take place in uterine prolapse. The primary uterine vascular trunks have to take a new direction; and were it not for the fibro-elastic structure of the before-named cellular processes surrounding them, the latter would give way, and the retention of the reduced prolapsus be impossible. (Pl. XIX.)

Hypertrophic (Huguier) *Hyperplastic* (Virchow) *Elongation of the Supra-Vaginal Uterine Cervix.*—Here the inversion of the vagina is occasioned by an enlargement of the supra-vaginal cervix in a longitudinal direction, the elongation occasionally exceeding three or even four

times its natural length. This curious change is attended by a general expansion and thickening (rarely by sub-vaginal elongation) of the sub-vaginal portion of the cervix, due to the lateral action on it of the vagina in resisting the protrusion. The perineal changes are the same as in complete uterine prolapsus. The uterine body, usually unchanged, remains in situ, its ligamentous and cellular connections unaffected. The recto-vaginal peritoneal fold descends with the lower end of the cervix. The utero-vesical fold remains in place. The entire base of the bladder is prolapsed, this part of it composing the fore part of the hernia. The vesical ends of the ureters open at the lateral surfaces of this portion of the bladder. The peritoneal coverings of the utero-sacral ligaments, generally the entire structure, are profoundly affected, but the rectum is undisturbed, except occasionally, as in prolapsus. The strain upon the urethra causes a receding, or disappearance even, of the urethral orifice.

Should there be considerable lateral hypertrophy of the sub-vaginal cervix in this affection, there will be a marked outward resemblance to ordinary uterine prolapse. In such cases the retro-uterine peritoneal fold is often below the level of the os.

Calculous incrustations of the prolapsed bladder occur occasionally in cases of hypertrophic elongation.

Inversion of the Uterus.—The only essential anatomical conditions leading to this accident are a flaccid uterus and an open uncontractile os. In the absence of the first condition, reduction is impossible, even after removal of the organ. The inversion is seldom complete. The end of the finger can then be passed round the pedicle of the tumor within the os uteri, but is arrested at a short distance equally all round; when partially complete the character of the tumor, in respect to its attachment, resembles those of a polypus or a polypoid hyperplasm of one of the uterine lips; when complete no sign of os can be felt. As a rule the contents of the inverted uterus are—the uterine halves of the Fallopian tubes, nothing more; this for reasons as above stated. Among the many recorded cases of the removal by ligature of irreducible uterine inversion no mention is made to the contrary, but the following case shows the possibility of such a complication, when, as might after all be anticipated, the inversion is shared by the vagina.

1 Case: Complete inversion of the uterus and vagina, induced by the growth of a polypus attached to the fundus uteri. The tumor, at first confined to the vagina, gradually presented itself in the form of a considerable protrusion beyond the vulva. The attendant symptoms were profuse leucorrhœa, irritable bladder, occasional menorrhagia, by which the patient was worn to death in four years. Bladder and rectum in situ. The swelling protruded six inches, and consisted of the polypus as large as an egg, attached to the most depending part or fundus of the inverted uterus. This and the everted vagina made up the rest. The cul de sac thus consisted of, first, the inverted vagina, and, next, the inverted

uterus. It contained both ovaries and Fallopian tubes; also a coil of small intestine.

2 Case: Profuse menorrhagia at brief intervals during the last twelve months. Last parturition twelve months ago: some difficulty in removing the placenta. Tumor on the vagina pediculated, pyriform, the large end about the size of a walnut; neck or pedicle embraced, not constricted, by the os; moderately firm, fleshy, insensible; surface smooth, of a dark pink color. Patient said she felt no pain. Chronic inversion suspected, but opposed to this idea was the character of smoothness, insensibility, absence of bleeding points and its occasional prolapse beyond the vulva, constituting the very essence of a differential diagnosis in favor of polypus. On slight traction downwards all trace of uterine os is effaced; this reappeared on replacing the tumor within the vagina. A bougie was arrested half an inch above the os; it could be carried at this height all round between the latter and the pedicle of the tumor. Removal by ligature applied just within the os; recovery; vaginal tumor cylindrical; surface rough and villous; sanguineous discharge exuding at innumerable points; tenderness to the touch; these, the characteristic signs of inverted uterus, may be changed into those of polypus by a contractile os uteri.

3 Case: Vaginal tumor six weeks after labor, which was unattended by any untoward circumstances whatever. The usual signs of polypus present; those of uterine inversion emphatically absent. Repeated consultation; diagnosis, polypus; removal by écraseur, on a level with the os uteri. The tumor was an inverted uterus; no hæmorrhage; recovery without an unfavorable symptom.

4 Case: Vaginal tumor; history and physical signs those of uterine inversion, with a constricted os uteri; removal by ligature and écraseur. The tumor turned out to be a hyperplasm of the posterior uterine lip.

Uterine Tumors.

1 Case: Age 48; menorrhagia; the vagina contained a soft pediculated myoma the size of a pear, somewhat tender and giving out blood freely when touched. Pedicle encircled in front by the os uteri, could be traced to the posterior lip, with which it was continuous. Removal by ligature; recovery.

2 Case: Age 46; menorrhagia, and much watery offensive discharge; eventual protrusion from the os uteri of a myoma the size of an egg, with a peduncle the size of a goosequill, its surface smooth, red, and vascular; removal by torsion; no hæmorrhage; recovery.

3 Case: Age 27; menorrhagia following miscarriage; supposed retention of ovum. A soft myoma, the size of a thumb, hanging in the vagina from the uterine orifice; color bright red; bleeding freely when touched;

the pedicle the size of a quill; excision; free bleeding from a small artery; styptics; recovery.

4 Case: Patient young and unmarried; leucorrhœa and supposed prolapse of uterus; no derangement of menstruation. A long soft myoma, florid in color, hanging from within the os uteri; removal by torsion. Speedy disappearance of general symptoms of uterine prolapse.

5 Case: Age 27; menorrhagia, attributed to uterine prolapse; the tumor which appeared externally was about three inches long, an inch in diameter, tapering slightly downwards, its free end slightly ulcerated and altogether indistinguishable from an ordinary uterine prolapse, except by the absence of the os uteri. Hyperplasm of the posterior uterine lip; pedicle the size of the little finger. A strong arterial pulsation in the stalk; removal by écraseur.

6 Case: Age 45; regular menstruation; sensation of a lump in the vagina which occasionally comes down beyond the vulva with more or less subsequent hæmorrhage. Hyperplasm the size of a goose's egg of the anterior lip drawn into a pedicle the size of a forefinger. Ligature; recovery.

7 Case: Age 37; similar to No. 6; excision. Smart hæmorrhage, resisting hæmostatics; subsequent ligature of the attached part of pedicle; recovery.

8 Case: Age 46; hard myoma projecting from the os uteri; eventual descent of it into the vagina. Ligature by means of Gooch's canula; immediate excision below the ligature. The supposed pedicle proved to be an inverted portion of uterus. Retention of the canula; eventual recovery.

9 Case: Age 46; excessive menorrhagia for two years; tumor in the vagina the size and shape of a turkey's egg; on its surface rough, firm, and of a dull pink color. Peduncle thick as the thumb, closely encircled by the os uteri; écraseur; recovery. Tumor when laid open found to contain several almond-shaped cavities filled with blood; on the walls of the cavities there were projecting villi resembling in miniature the carneæ columnæ of the heart.

10 Case: Age 34; profuse menorrhagia. A hard myoma the size of a walnut, its pedicle traceable to the uterine fundus. Écraseur. No recurrence of hæmorrhage from the moment of the operation. (*Vide* Pl. XXVIII.)

Anomalies of the Uterine System.

Uterus absent with or without Atrophy of the Vagina or Fallopian tubes or Ovaries, with occasional coexisting malposition of the kidneys.

1 Case: Age 18; amenorrhœa; vulva and mammæ normal; bladder and rectum in close contact; the transverse fold of peritoneum connecting them together superiorly representing the broad ligaments, contained on each side a bilobed ovary: no vagina.

2 Case: Age 17; amenorrhœa; vulva and mammæ normal; a vagina half an inch long; above this, bladder and rectum in close contact; a very largely developed tube and ovary on each lateral ligament; no uterus, but in its place a round body the size of a hazel-nut, situated where the tubes tended to unite at the middle line.

3 Case: Age 22; amenorrhœa; vulva and mammæ normal; vaginal orifice indicated by a slight depression between the meatus and fourchette; transverse peritoneal fold representing the lateral ligaments contained, on each side a hard prominent fusiform body, giving off a rudimentary round ligament and a permeable rudimentary Fallopian tube. Two well-formed ovaries in their usual situation.

4 Case: Complete absence of all trace of uterus, vagina, and ovaries. The rectum and bladder normal. State of vulva and mammæ not recorded as a rule; these are imperfectly developed when the ovaries are absent.

The lateral half of the uterus absent; with or without vestiges of a round ligament or Fallopian tube. Frequent absence, or displacement, or malformation of the kidney of the same side.

1 Case: Age 40; death shortly after the birth of twins; the patient already the mother of eleven children. Complete absence of the left uterine appendages and left side of uterus to within half an inch of the middle line: also of the left lateral ligament. A rudimentary confused mass attached to the half uterus instead, from which departed a round ligament to be attached to the spine of the pubis.

2 Case: Infant; age 15 days; no vestige of right half of uterus and appendages, but vestiges of the latter, detached, in the right lumbar region.

The uterus in such cases is greatly altered in form, varying between that of an inverted cone to an elongated cylinder with a single tube and ovary.

Uterus double, or united at the cervix, or single externally, with an external median septum; in the latter case the form of the organ usually is more or less globular.

Fœtal examples only of complete double uterus are recorded, all of them accompanied more or less with other malformations in ectropic bladder, absence of pubis, imperforate rectum, spina bifida, &c.; but—

Case: Age 28; pregnancy shortly after marriage. No trace of umbilicus, instead of it a fleshy, spongy excrescence the size of an egg, three inches below the normal situation; two small openings about an inch apart on the lower edge of this excrescence, from which urine constantly escaped, guttatim; the vaginal orifice scarcely admitting the little finger a quarter of an inch below these openings. About two inches below the latter another orifice, situated exactly where should have been the pubic symphysis; the anus natural, provided with a sphincter two inches more posteriorly. It was necessary to divide the interval between the two former (vaginal primary and secondary ?) orifices to admit of the passage of the child.

An instance of complete double uterus and vagina; single well developed appendages to each uterus. The two uteri and vaginæ lying side by side separated by a perfect and continuous median septum throughout. Bladder and urethra and rectum normal. Vulva single, presenting two well-defined vaginal orifices. Age of subject not mentioned, but the sexual organs are represented on the figure (Eisenmann Tab.) covered with hair.

Two uterine bodies distinct and more or less widely separated, the corresponding double cervix closely united. Numerous examples recorded. Each uterus provided with a special os opening into a special vagina, the two lying side by side separate and distinct throughout, with two distinct vaginal orifices; the adjoining vaginal surfaces easily made to glide freely on each other between the finger and thumb. The chief varieties are, a single vaginal orifice ; a single os ; more rarely, a single os with double vagina, and *vice versâ ;* vaginal septum incomplete. The cordate uterus indicating partially externally the complete internal duplicature, or the latter condition with no external indication, the uterus then often globular, or the uterine septum incomplete, not extending to the cervix.

Uterus imperfectly developed; or if so up to a certain epoch, ceases to grow with the growth of the individual (*Infantile uterus*), or if normal in length its walls are deficient in erectile structure, being little more than a membranous canal; or possessing this in small degree there is no uterine cavity; or mixed forms of deviation admitting of no precise classification.

Deficiency or inequality in concomitant developmental metamorphosis of the Wolffian body and Müller's duct is supposed to be accountable for these curious deviations, leaving nevertheless for the science of morphology very much to explain.

Some recorded instances of allied Uterine Functional Anomalies.—1. Double vagina, each separately leading to a corresponding os tincæ of a presumably double uterus. Coitus indifferently by either; menstrual fluid from each vagina at the usual period. 2. Unobstructed menstruation by one vagina; obstructed menstruation on the uterus corresponding to the other; death by bursting of the latter into the peritoneum. 3. Instances of menstruation from each vagina at different epochs. 4. Double uterus and vagina. Pregnancy of one uterus with formation of a decidua on the other. 5. Unequal development of the two uteri; impregnation in the less developed uterus; rupture and escape of fœtus into the abdomen. 6. Pregnancy suspected: menstruation regular, presumably from the unpregnant uterus; sudden death; escape of fœtus into the abdomen from rupture of the pregnant one. 7. Double contemporaneous pregnancy of a double uterus, noteworthy because proving that an ovule can be discharged from each ovary at the same period. 8. Double uterus, each uterine body greatly inclined in opposite directions away from each other, the obliquity involving rupture or delivery of peculiar difficulty.

Sundry cases cited point strongly to the possibility of *Superfœtation* with a double uterus, and to the probability that most of the so-called *Tubal pregnancies* were strictly uterine.

Imperforate Uterus.—1 Case: Age 22; amenorrhœa, with urgent signs of menstrual retention. No trace of uterine cervix; puncture per vaginam; escape of thirty ounces of fluid through the canula; menstruation regular from the time of the operation.

2 Case: Age 18; amenorrhœa; no trace of cervix, considerable uterine enlargement; puncture and escape of three pints of dark bloody fluid; speedy death from peritonitis. Uterus the size of one at the sixth day of post-partum involution, containing a small clot.

3 Case: No trace of cervix; the site of the uterine os indicated by a slightly protruding membrane apparently continuous with the vagina; puncture there; recovery.

4 Case: Rudimentary uterine cervix apparent; no sign of uterine os or labia. Puncture with a bistoury in the presumed normal situation of the latter; death on the third day from peritonitis.

5 Case: Cervix present; the place for the uterine os indicated by a minute depression; puncture there; escape of ill-smelling clots. The opening was maintained by sponge tents. Recovery after dangerous constitutional disturbance, with signs of local inflammation. The closure in this case appeared due to an actual imperforate vaginal cul de sac.

6 Case: Age 19; amenorrhœa; hymen imperforate; this being removed, another imperforate membrane higher up the vagina; puncture with a trocar; escape of three pints of thick dark fluid. Pregnancy five years afterwards; it was found necessary at the labor to make a crucial incision into an utterly unyielding os uteri.

Anomalies of the Vagina.—Vagina opening into the rectum.—1 Case: Absence of vulva appendages, no vaginal aperture; impending parturition; a perpendicular incision over the site of the vaginal orifice; protrusion and rupture of fœtal membranes at the opening, and speedy passage of the child without accident. Pregnancy had been effected through an opening from the vagina into the rectum just within the anus.

2 Case: External organs fully developed; the introduction of the speculum effected without difficulty, disclosing, not the os uteri, but a mass of fæces. There was no anal aperture, no sign of anal sphincter; at the site of the former a small brownish spot. No evidence of vagina or uterus could be discovered; nothing could be felt intervening between the bladder and rectum. The patient had never menstruated. Her husband was not aware of the peculiarity.

3 Case: External sexual organs normal; absence of anal orifice. The rectum opened into the vagina an inch within the vaginal orifice by an undilatable valvular aperture which would not admit the finger. The patient was the mother of three children, but neither she, the accoucheur, nor the husband had been aware of the deformity.

4 Case: Amenorrhœa, but general health perfect. External genitals

normal. Absence of urinary meatus; the clitoris a small mucous caruncle with a rudimentary preputial covering; vagina two inches long, terminating in a cul-de-sac. Evidences of uterus entirely absent. The finger passed readily into the bladder through a sort of valvular opening an inch within the vaginal orifice, probably through the urethra. The patient never experienced sexual desires. Sexual congress always caused escape of urine.

Absence of Vagina, complete or incomplete.

1 Case: Age 15; intense suffering for the last two years at each menstrual period. Outer sexual developments normal: uterine tumefaction equal to that of a pregnant uterus of six months. After unsuccessful attempts to make a passage to the womb between the bladder and rectum, the uterus was punctured by the rectum; escape of a large quantity of thick dark fluid. The canula was retained in place by tapes. The bowels acted naturally three days after the operation. The canula was not removed for fifteen days, the bowels acting daily without much inconvenience; but the discharge ceased on the third day. The next catamenia appeared per rectum. Eventual history not known.

2 Case: Age 17; amenorrhœa with much monthly suffering. Vaginal imperforation at the vulvar end; a trocar was introduced presumably in the right direction to the extent of three inches; escape of the usual fluid at first in small quantities; there was a free discharge of it the next day. A normal uterine os could be felt through the new passage after gradual dilatation by bougies: death in a few months, apparently by slow marasmus, commencing from the date of the operation.

3 Case : Amenorrhœa with the usual distress; vaginal obliteration apparently by a thick hymen; great uterine distention; the operator after puncturing the hymen, finding the obliteration more extensive, in attempting, by successive incisions, made with great caution, to reach the uterus through the vagina, which he assumed to be patent higher up, made his way into the bladder. Death from rupture of the uterus into the abdomen. The mistake was only revealed at the post-mortem.

4 Case: Age 20; amenorrhœa, vaginal orifice entirely absent; by means of the finger in the rectum and a sound in the bladder it was ascertained that there was complete absence of the vagina, nothing but a thin fibrous cord extending about an inch and a half from the vulva; with the left forefinger in the rectum, the sound being held in the bladder by an assistant, the operator made a *transverse* incision between the meatus and the anus, continuing the dissection with a bistoury guarded to within a short distance from its point, taking care not to travel from between the finger and the sound. Having thus without accident made his way between the bladder and rectum up to the hard, thick cartilaginous wall of the uterus, he passed through it a trocar, letting off a large quantity

of fluid. An elastic catheter was left in the opening, and the uterine cavity washed out daily. Recovery without an unfavorable symptom. Nothing like the uterine os and cervix existed. It was found impossible to dilate further the passage made by the operation. Eventual history not known.

5 Case: Age 19; amenorrhœa, and much monthly suffering during the last two years. External genitals normal; between the nymphæ, clitoris, and fourchette, the site of the vaginal orifice a mere depression. Urinary meatus in its usual place. Uterus greatly distended. The uterus was reached by an operation similar to that above. No sign of cervix or uterine os perceptible; puncture by trocar at the most yielding point, and the opening slightly enlarged by the bistoury; escape of much dark-colored fluid and clots: dilatation attempted to be maintained by lint round an elastic sound. Eventually it was found necessary to destroy adhesions, attended by rapid contraction of the passage, and repeat the uterine incisions. Recovery. At the confinement of the patient, a year afterwards, it was found necessary to incise the uterine aperture to give passage to the fœtal head; delivery effected by forceps with much laceration of the perineum; death from peritonitis eight days afterwards.

Two similar cases in which the new passages required repeated surgical dilatations eventually only very partially effectual.

6 Case: Age 19; general conditions as above; not the least trace of vaginal aperture; the finger in the rectum and sound in the bladder revealed considerable thickness of dense tissue but no sign of vaginal tube. The bladder was kept out of the way as much as possible by the sound entrusted to an assistant, and the rectum also by the finger of another assistant, and a passage opened between the two by a series of transverse incisions to the extent of about two inches, when the finger came in contact with the right side of an obliquely inclined uterus; the cervix was felt much to the left. As the malposition resisted all attempts to rectify it, a puncture with a bistoury was made in the side, with the escape of a small quantity of fluid. Signs of peritonitis for the first five days, when the uterus returned spontaneously to its place, the remaining fluid escaping freely by the uterine os: recovery. Two years and a half afterwards the os was found abnormally small, attended with much dysmenorrhœa.

7 Case: Age 17; general conditions as above, except as to uterine tumor. The sound in the bladder was left to an assistant. The operator, with the forefinger in the rectum, following the incisions with the thumb of the same hand. There was a uterine cervix, but imperforate. As the uterus was normal in size no puncture was made in it. The patient soon afterwards married. The new vagina (?) notwithstanding gradually narrowed; urgent symptoms of uterine retention led to the operation of puncturing the uterus, which was quickly followed by peritonitis, and death.

8 Case: Age 15; general conditions as above, except the urinary

meatus was situated much lower down than usual; no trace of vagina. The operator determined to proceed on the principle of gradual separation, without incisions. A depression at the assumed site of the vaginal orifice was made by the handle of an ordinary conductor followed by the tip of the little finger. The next day with the forefinger in the rectum, the operator forcibly depressed the lower margin of the depression, at the same time attempting to make it deeper by the finger as before; the result was an opening, which would retain a sponge tent; these manœuvres were repeated daily for ten days in succession, when he was able to carry his finger up to the uterus, which was found hard and resisting, presenting no sign of cervix or uterine os. A straight bistoury, guarded with lint and tipped with a small mass of wax, was guided on the back of the finger and passed into the tumor, giving issue to some fluid. As the opening resisted every attempt at dilatation with the finger, recourse was had again to the bistoury. After constitutional symptoms of great gravity, attended by much loss of blood from the uterus, the patient recovered. Two years afterwards, menstruation having continued regularly in the interval, the vulva was found drawn up in a way to form part of a passage now about an inch long, instead of three inches when first made. At the end of it was a body, doubtless the source of the menstrual discharge, but otherwise anything but suggestive of a uterus.

9 Case: General conditions as above. Urethro-vaginal vestibule a solid structure, giving no indication whatever of a vaginal orifice. The urethra in its normal place, but admitting easily the passage of two fingers; no uterine tumefaction; the patient was married; coitus per urethram. With the left forefinger in the rectum the operator commenced with a longitudinal incision at the median line, and continued the dissection to the depth of two inches through a tissue extremely hard and resisting, which appeared to occupy the place of the vagina; a large bougie was now introduced, which was urged on in the presumably right direction by repeated blows at the other end; daily attempts of the same kind were continued for a week, and the uterus discovered. It was well formed and in its normal state. The patient soon after menstruated, and was subsequently delivered of twins.

10 Case: Amenorrhœa; no uterine tumor. Complete absence of vagina; operation by dilatation. The operator stopping somewhat short of the uterus, in the hope of completing it more safely, when the remaining tissue intervening should be distended by menstrual fluid resulting from the uterine function provoked possibly under the new circumstances. The patient was not heard of till years afterwards, when she complained of violent dysmenorrhœal pains at the usual monthly periods, occasionally only relieved by hæmaturia. The new vagina (?) had not contracted; it was lined by a rose-colored membrane; smooth, without vestige of vaginal ridges; it was still closed at the upper end. A catheter introduced into the bladder entered a cavity beyond, into which opened the uterine cer-

vix. The uterus was in a normal state. It transpired that the patient had after the operation taken to prostitution.

11 Case: General conditions similar to Case 10, except that there was regular menstruation per rectum. The menstrual fluid subsequently appeared by the new vagina (?) formed by the separation process. At the end of two years this passage was barely perceptible. The menstrual fluid had resumed its former route per rectum.

12 Case: Age 17; complete absence of vagina; uterine distention great, impeding micturition and defæcation. External genitals perfect. A passage to the uterus was made entirely by the process of slow separation in daily stages. At the end of a fortnight the uterus was reached. There was no uterine os nor cervix. The part of the uterus punctured by the trocar was hard and resisting; escape of a large quantity of the ordinary fluid. Recovery after considerable constitutional disturbance. Cessation of catamenia four months afterwards with return of the uterine distention. The opening this time made with the trocar was enlarged by the bistoury. Marriage two years afterwards; catamenia regular since the last operation; the rather short vaginal canal continued patent. No sign of pregnancy.

13 Case: Age 18; amenorrhœa; lumbar pains, with occasional epileptic seizures. Hymen imperforate. Uterus not distended; no sign of fluid behind the hymen, which was divided by crucial incision and flaps removed; great narrowing of vagina: slow dilatation by means of tents; the vagina found completely closed about two inches from the entrance; a small cylindrical speculum guided by a finger in the rectum and a sound in the bladder, held by an assistant, was passed up to the obstruction, which was opened by a guarded knife. There was a uterine os and cervix imperfectly developed. Two years afterwards, the patient having married soon after the operation, there was a vagina admitting easily the largest speculum. Menstruation had never taken place, but the patient was in perfect health.

14 Case: Absence of vagina; uterine retention. A small trocar was passed between the rectum and bladder with due precautions against wounding either; the passage made by the trocar was dilated laterally by a double lithotome. The trocar had fortunately passed into the distended uterus, which commenced immediately to expel its contents. The operation lasted not quite five minutes, and was completed so far without untoward accident. Death on the seventh day with symptoms of blood poisoning. Evidences of intense uterine inflammation; both Fallopian tubes livid and enormously distended with dark fluid: below the uterine cervix, which had been perforated slightly on one side of the uterine os, a considerable space limited by the bladder in front and rectum behind, and laterally by ill-conditioned adhesions; lower down, towards the vulva, the bladder and rectum were separated only by the channel made by the trocar.

Surgical Notes and Reflections.

The position of the uterus in the pelvis depends on the state of its cellular connections, the inclination of its axes on that of its ligaments, its dimensions on its functional state. The normal variations as to these conditions vary infinitely even in the same subject, so that it is not possible to define a standard of uterine relations.

Congenital variations are frequent and numerous; defective or unsymmetrical development leads to variations of form and position, for which surgical treatment would be worse than useless—viz., lateral flexion through a semi-developed uterine body, standing immovably in the broad ligament, at an angle with an upright and more or less perfect neck; a semi-uterus in the shape of an inverted cone; or in a globular form; with deficient or absent cervix. The infantile uterus. Congenital anteflexion or retroversion; or a cavity in a uterus deficient in medulla, the uterus a mere tube, &c., and *vice versa*. (*Vide* Cases.)

The morbid uterine variations are also innumerable, due generally to an acquired disproportion between the uterine body and cervix, leading to anteversions, anteflexions, retroversions, retroflections, oblique and even lateral versions, pelvic sinkings, or the reverse; uterine twisting, total or partial, of the uterine body on the cervix, or actual separation from one another. Actual vaginal procidentia depends, not on the increased weight or volume of the uterus, but on the condition of the vagina; such displacements being induced by the tendencies of the latter to invagination, induced for the most part by a dilated condition of the vaginal orifice.

Displacements of the normal uterus are being incessantly produced as a consequence of the ever-varying state of the bladder and rectum. Vaginal procidentia ; inguinal and crural uterine hernia, consisting of the uterus, tubes, and ovaries, or of the latter only. Two instances are recorded (Farre) of Cæsarian section in irreducible hernias of the latter description; also well attested cases of extro-version of the uterus and placenta (Foster, *Lancet*, Feb. 6, 1869). Allison (*British Med. Journal*, June 5, 1869) found the uterus containing the child in the bed. In this case the gravid uterus was reduced, the woman having afterwards a good delivery by the natural passages.

The pouch of Douglas behind and the bladder in front, notwithstanding the yielding character of its uterine cellular connections, *invariably* follow the uterine cervix, maintaining unaltered relations with it, whatever be the nature of the displacement. *This is actually a rule without exception, never disregarded without evil consequences.*

Surgical proceedings for the amputation of the uterine cervix should invariably be governed by the above rule. Cervical hyperplasm may be infra-or supra-vaginal; there is no recorded instance of the two forms existing together in the same cervix. True supra-vaginal hyperplasm, in extreme degree, presents itself as an irreducible vaginal procidentia of the

cervix, the uterine body remaining in place. In Huguier's operation the labia uterina are included within an elliptic incision, made *exactly* at the line of attachment of the vagina to the cervix; the operator takes care that his subsequent dissections, to free the portion of cervix he desires to cut off, should involve the uterine tissue *only*, so as to insure immunity to the bladder and Douglas's pouch, both from the first being in highly dangerous proximity. The operation requires a host of precautions, and never need be adopted when the protrusion can be reduced so far as to admit of the use of a pessary; sustained pressure on the cervix leading, in my experience, to rapid diminution of the hyperplasm. It is true that M. Huguier's cases have been successful. He uses no sutures of any kind. As many as ten arteries have required separate ligature; bleeding from the uterine tissues he treats by transfixion with fishhook-shaped pins and a ligature behind them, cutting off the redundant metallic points. The uterus is apt to retire out of reach immediately after the section. The vagina is afterwards sustained by pledgets soaked in some styptic disposed round a central bougie. Accidental punctures of the bladder, he states, heal readily by simple suture, but wounds of Douglas's fold cause him to stop the operation there and then, the patient being afterwards carefully treated and watched. There is a form of supra-cervical elongation without hypertrophy: in this the apparent reduction may be due to a bending of the comparatively thin cervix.

The precautions to be observed in removing infra-vaginal cervical growths are sufficiently obvious.

As the uterine cervix passes through the plane of support, leaving an inch or more within the vagina, and the entire uterine body above, comparatively free, considerable oscillatory movements without actual displacement can, and indeed incessantly do, take place. As the cervix occupies the centre of the cavity of the true pelvis, it is scarcely more than two inches from the vaginal aperture, and can therefore be readily drawn *forwards* in the obstetric line, by a vulsellum or fine hook, fixed on the anterior lip, to within an inch of it, without any drag whatever on the uterine ligamentous attachments: a Sims' or Foveaux' retractor applied to the fourchette brings the cervix into clear view. Too much advocacy can scarcely be given to this manœuvre preparatory to any operative proceeding beyond the limits of the infra-vaginal cervix. It is most important to diagnose correctly the actual state of the uterus before attempting an operation, so trivial even as surgical dilatation of the infra-vaginal cervix, incomparably more so when it is proposed to carry the section on, through the isthmus. Having divided the sub-vaginal cervix with or without any of the absurdly numerous machinery invented for that simple purpose, the operator may feel his way with an ordinary round-ended scalpel of a small size through the isthmus. Numerous deaths have been caused by the blind and indiscriminate employment of special machines, more particularly by those acting automatically, carried through the isthmus, forgetful that constriction there, whether congenital

or the result of uterine flexion (wherein the constriction is accidental and not so remediable), may be part of a morbid uterine state not amenable to surgery, or associated with an attenuation of the uterine wall, rendering highly dangerous the touch of the hysterotome.

Division of the cervix through the labia should evidently not extend above the insertion of the vagina; division laterally, if carried too far, tends to defeat the one chief object of the operation (cure of sterility); a permanently patent os and cervix uteri is inconsistent with the dovetail approximation of the arbor vitæ and processes, a notable function in a uterus normally disposed for conception.

There is a functional antagonism between the uterine cervix and uterine body, to this extent at least, that contractility in the latter is powerfully promoted by forcible dilatation of the former. Uterine hæmorrhage and the vitality of soft intra-parietal hyperplasms may often be beneficially, sometimes signally, controlled by incisions destroying the future contractility of the cervix.

Enucleation is admissible for hard myomas only; all other forms are inseparable by that process from their uterine cell. The myoma must not be large, or it cannot be brought away by the vagina; besides, in very large hard myomas, the uterus usually forms a part of, and is scarcely distinguishable from the tumor, a state favorable for amputation of the uterus by gastrotomy, but evidently not so for enucleation. The following case is a remarkable exception. Uterus enlarged; extremely hard; in size equal to pregnancy of seven months; no vascular murmur perceptible; gastrotomy. The uterus and uterine vessels presented exactly their appearance in advanced pregnancy; enormous veins contorted in all ways covered the sides and fundus of the uterus. It was evident that the hard mass within did not form an integral part of the uterine wall; Cæsarian section. With admirable promptitude and rapidity the operator, Mr. Spencer Wells, succeeded in tearing forth what proved to be an immense hard myoma; the uterus, in a state of chronic distention for at least five years previously, contracted instantly, and with this there was immediate cessation of hæmorrhage. The patient died shortly after, apparently from the shock of the operation.

Myoma of the uterine cervix or vagina generally of the hard variety, are necessarily small, owing to the minor proportions between the cortex and erectile matrix, and best admit of successful enucleation.

The proportion of erectile matrix in the uterine labia is again proportionally much greater; the uterine cortex being thin, myomata of either labium form polypoid tumors greatly resembling an inverted uterus. Elongated hyperplasm of the sub-vaginal cervix resembles uterine procidentia. (*Vide* Cases.)

Simple inversion of the uterus is rarely attended by vaginal inversion. The uterus, strictly speaking, is not displaced, and the finger or sound can usually be carried round between the uterus and a ring of uninverted cervix; but this is sometimes effaced by slight traction on the uterus,

leading, without special care on the part of the operator, to the amputation of the organ beyond the prescribed line. In uterine inversion caused by a fundal myoma, there may be complete or very considerable vaginal inversion, but the organ and tumor may be safely removed by keeping below the utero-vaginal line.

An inverted uterus contains the uterine half of the tube and utero-ovarian ligament, not the ovary; in the first place, the cavity of the inversion would not perhaps hold more; in the next, and chiefly, the ovary, owing to the spinal attachments of the corresponding portion of the musculo-peritoneal uterine platysma (posterior round ligament, Rouget) is the last to descend in any case (*vide* Pl. XII.); but the ovary and some intestine may occupy the upper part of the inverted bag of vagina in cases of inverted uterus with *complete* vaginal inversion.

A very slight amount of constriction at the cervix is sufficient to do away with the test signs of uterine inversion, such as rough bleeding surface, tenderness to the touch, cylindrical conformation, &c.; the tumor rapidly assuming the external characters of ordinary polypus, pear-shape, smooth surface, insensibility, absence of surface hæmorrhage, &c. Constriction enough to produce perceptible congestion in an inverted uterus must include the vascularization of the outer surface, otherwise a noticeable pallor is the primary and only phenomenon following the application of a ligature to an inverted uterus.

The constitutional disturbance, persistent and often alarming, ensuing immediately after injection of the uterus, at first sight is difficult to account for. Such consequences *never* happen when the cervix has been submitted to mechanical dilatation long enough to paralyze its tendency to close in that dovetail fashion above alluded to; a very slight amount of dilatation kept up for several hours will prevent the arbor-vitæ processes from thus coming together; but symptoms as remarkable have followed vaginal injections merely. The subjects of the very rare instances of the latter kind were uniformly young girls, in whom the antero-posterior tendency to approximation and dovetailing of the opposed vaginal columns and processes continued undiminished. (Savage: *Lancet*, Dec. 5, 1857.)

The uterine cavity in the virgin uterus is a mere rima of separation between the antero-posterior inner uterine surfaces; when enlarged it becomes a cavity of three dimensions, but there never is an approach even to uniformity in this enlargement, so that the measure of any one dimension only, as imagined (Richet), would be but an imperfect guide to the knowledge of the measures of the other two.

Hard myoma is obviously the only form of uterine tumor which could in safety be treated by the processes of boring or gouging, and for them such treatment would be useless.

Uterine hæmorrhages not traumatic are invariably menorrhagic; hæmorrhage from a uterine tumor is an accident. The amount of discharge depends on the amount of uterus left unaffected, but its prone-

ness to assume the menorrhagic state has no definite relation to the size or shape of the tumor. (*Vide* Cases.)

The introduction of uterine tents is greatly facilitated by drawing the cervix forwards, as above described. In some cases the introduction can be effected in no other way.

Submucous uterine polyp usually occurs singly; it is rare to find more than one at a time of any notable size, but Dr. Kidd (*British Med. Journal*, Jan. 30, 1869) speaks of having been obliged to remove twenty-nine of such tumors from one patient in the course of twelve months. Previous to each of his four operations, he took care to dilate the uterus cervix by the novel method of introducing as many cylinders of sea-tangle as he could, *without force*. Some of the tumors were large and pediculated, many as small as a pea; the écraseur had to be used freely. Dr. Kidd's opinion that removal of half a tumor is usually sufficient, is scarcely borne out, by their reappearance in his case, at such short intervals.

Uterine myomas never originate after the climacteric period, nor make their appearance before puberty.

Uterine lameness (Graily Hewitt): a form of lameness associated with uterine displacements involving the pelvic nerves? is more commonly associated with hæmatoma or abscess in the immediate neighborhood of (or within) the iliacus muscle, and certain forms of pelvic retro-peritoneal sarcoma.

The important part performed by the pelvic cellular tissue in the preservation of the uterine pelvic relations is particularly well exemplified by pelvic cellulitis; the fixation of the uterus almost immovably in the pelvic cavity is one of the earliest evidences of the affection.

In plugging the vagina its great distensibility must not be overlooked, for fear of interrupting the functions of bladder and rectum.

Cysts of the vagina are necessarily separation or transformation cysts. The vagina possesses neither follicles nor glands.

Retro-uterine myomas often descend so as to invade the upper and back part of the vagina. When cystic they are easily mistaken for vaginal cysts in that situation.

Vaginal cysts in the neighborhood of the urethra are follicular urethral retention cysts.

Recto-vaginocele, Cysto-vaginocele.—The vagina where these two affections occur, rarely more than two lines in thickness, is occasionally much attenuated; as the lining membrane is too closely identified with the outer muscular portion to admit of easy separation in one continuous layer, the redundant portion removed, may unintentionally consist of all the vaginal wall, instead of the lining membrane as intended. The mistake in my experience leads to no ill consequences; in fact, in Huguier's operation this is done purposely. The portion of vagina to be removed is isolated from the bladder or rectum, and transfixed by a series of needles passed transversely one above another, taking care by the finger

in one or other, as the case may be, that the rectum or vagina *only* is included; a loop of ligature is tightened behind each needle, and then the whole of them comprehended in a triple thread; behind this the écraseur is applied and slowly worked, guided by the finger which served to guide the needles; in this way a considerable patch of vagina is removed without implicating bladder or rectum. Bleeding vessels being secured, the aperture is left to close by contraction without the aid of any sort of suture.

A vaginal orifice preternaturally dilated leads sooner or later to vaginal invagination, and with it necessarily uterine prolapse. There are sundry plastic processes for keeping the uterus out of the vagina; the principle is the same in all of them—diminution of the calibre of the vaginal canal by bringing laterally together by suture the margins of a surface denudation; these are invariably made on the upper part of the procidentia, and the line of sutures, when this is reduced, occupies the vesico-vaginal septum; if such processes do anything in cases where the vaginal aperture returns naturally or by operation to its natural sizes they certainly fail eventually otherwise. (Perineal operation: *vide* Pl. XXII., XXIII.)

Pessaries act after the manner of the foregoing operations: that is, they keep the uterus out of the vagina. The best form of pessary is that which by acting laterally leaves the bladder and rectum free, and favors the antero-posterior approximation of the vaginal walls, relieving the pelvic cellular processes connected with the vagina from undue strain, and thus assisting both to regain their tone and resistance. The long-continued irritation of a pessary can induce vaginal atresia. (*Vide* Cases.)

"Vaginismus" from simple vaginal atresia, whether or no the result, as it generally is, of some morbid state, perhaps long antecedent, yields readily by dilatation, when the perineal body is dilatable, not otherwise. Laceration of the vaginal ring from over-distention is often followed by the return of the atresia in a more aggravated form; for the same reason incisions in any part of the ring but that occupied by the perineal body are objectionable. (*Vide* Pl. II.) Case: Age 40; menorrhagia; great exhaustion; three balls of charpie dipped in pure solution of perchloride of iron followed by more charpie wetted in a weaker solution of the same salt introduced into the vagina. The plugs were removed in forty-eight hours, no pain having been caused by them. Five days afterwards, violent burning pain of the vagina; seventeen days after a large piece of the lining membrane of the vagina sloughed away. Six weeks afterwards, on the recurrence of the menorrhagia, a very resistant fibrous vaginal constriction was discovered scarcely admitting the little finger; about an inch higher up another constriction, involving the uterine cervix. (*The Practitioner*, March, 1870.)

Bladder and Urethra.—The cervical sphincter brings the contracted bladder into a shape nearly spherical. The urethral sphincter is a compound muscle, like the anal sphincter, with the remarkable peculiarity of

being at the same time an erectile conformation. One of the consequences is that those lacerations or distentions, sooner or later recovered from, in case of the former, permanently destroy the sphincter functions of the urethral sphincter, producing incurable incontinence of urine.

There is much greater difficulty in working lithotritic instruments in the female bladder than in the male. The female bladder when contracted on a calculus in size adapted for lithotrites, is a powerful organ with thick, muscular, highly contractible walls, and the weak constrictor action of the erectile urethral sphincter round the instrument will not prevent the escape of the distending fluid. When the bladder is fully contracted, the area of the vesico-vaginal septum is very limited; this and the relations of the ureters should not be overlooked in the performance of vesico-vaginal lithotomy, which, with due precaution, gives the best results, provided the operator deals with the resulting fistula on the principles laid down in Pls. XXIII., XXIV. *On no account should the incision be transverse.*

Vestibular lithotomy is in every way a bad operation. The operator seeks to make his way through the space between the root of the clitoris and the meatus. The knife, in passing into the upper part of the neck of the bladder, traverses the urethro-pubic space (*vide* Plate); but the triangular interval left by the divergence of the pubic rami will not admit of the extraction of a calculus of moderate size without fatal laceration of the sphincters.

Lateral lithotomy has been performed with success by Professor Andrew Buchanan of Glasgow. The knife might probably enter the groove of the staff where the urethra ceases to be confounded in the wall of the vagina. Dr. Buchanan says, the inner orifice of the urethra: the delicate integument on the inside of the left labium, is divided to nearly its whole extent from the level of the clitoris downwards, the parts subsequently involved in order to enable the operator to draw towards the median line the vagina and urethra, in front, inseparable from one another, are seen in Pls. I., II., III., IV., V., VI., VII. "The opening in the bladder can be made sufficiently large to allow any stone to pass that can be extracted from between the branches of the pubis. In three of my own cases the stones were of the largest size. In one of them the bladder was filled with a mass resembling mortar that had to be dug out with a scoop. In the second the stone was nearly of the same consistence. In the third it was compact, and weighed from three to four ounces. In no case have symptoms of a serious kind followed the operation." (*Extract from a Special Communication from the Operator to Dr. M'Clintock.*) Precautions in respect to the recto-vesical fascia the same as in the male. (Pl. XIV.)

The Urethra is liable to—1, general hyperplasm with elongation and protrusion of the urethral orifice; 2, mucous follicular polyp; 3, hyperplasm with protrusion of the mucous membrane; 4, caruncular (irritable) excrescence at the margin of the meatus. The effect of surgical proceed-

ings in regard to them, owing to the erectile peculiarities before named, is seldom enduring without the subsequent use of the actual cautery, carried if needs be along the canal of the urethra to its entire extent; 5, varix angioma of the urethro-vaginal tubercle, first observed and described by Sir C. Clarke as thickening of the urethra. Polyps projecting or not from the meatus are always urethral; *vide* structure of the mucous membrane of the bladder.

The forces governing the function of micturition are strictly urethro-vesical. The expulsive action of the vesical muscular coats is counteracted by the constrictor action of the vesico-urethral organic sphincters. The striæ of voluntary fibres added to the latter serve to restrain the act till the convenient moment. A retentive new urethra through the urethro-pubic vestibule therefore must necessarily be a vain expectation.

As has been stated above, the longitudinal outer muscular fibres of the bladder having firmly attached themselves all round to the vesicle sphincter pass away from the urethra at an angle to their final attachments to the vagina and arch of the pubis, leaving an interval containing the urethral-venous plexus. In this way Sappey imagines the neck of the bladder can be actively dilated by their tendency to become straight between two points—viz., the contracting bladder and their pubic attachments.

Anatomically the question of absorption is decisively against its possibility, as a function of the mucous membrane of the bladder. Compare what has been stated on this head with the description of the mucous membrane of the rectum, where that function is pre-eminently active.

Vulva.—Besides the deformities already noticed, there is a sort of analogy to the male perineum. The two labia unequally developed, or scarcely so at all, are separated more or less, leaving a flat intervening space formed by the two nymphæ confounded together at the median line. The vaginal orifice, if any, is closed and forms a part of the structure; the urethra is a mere orifice at the root of a large clitoris, or the latter may be nearly deficient. It is not known how far this conformation may be correlated to a state of development of the uterine system equivalent to the early stage of hermaphrodism.

The anatomical relations of parts concerned in excision of the whole vulva or any part of it (*vide* Pls. I., II., III., IV., V.).

Rectum.—The mucous membrane of the rectum is often the seat of follicular polypoid growths with pedicles occasionally long enough to permit of their passing through and hanging pendent from the anus. They are more often seated at the upper end of the rectum, where they can be felt in annular fringes formed of numerous polyps of notable size and length, being not unfrequently the undiscovered cause of a rebellious and exhausting form of dysentery. They are easily removed through the anus; the anal sphincters always return to their normal state after an amount of dilatation, which for reasons already given would be fatal to the sphincter function of the female urethra.

The relations of the pouch of Douglas have given rise to much controversy. In forming the anterior layer of the pouch, the peritoneum, continuous on each side with that lining the retro-ovarian fossa, descends from the posterior surface of the uterus between the utero-sacral ligaments to a point from one to two fingers' breadth below the uterine cervix, and so comes in contact with the posterior vaginal cul-de-sac. Except as a consequence of fluid accumulation or retro-uterine tumor it has been maintained that the extreme end of the pouch never descends below the utero-vaginal attachments. The following case goes to show this to be a dangerous assumption. Case:—Cancroid tumor of the uterine cervix about the size of a Sicily orange, the chain of the écraseur was carried round the base of the tumor just at the reduplication of the vaginal cul-de-sac antero-posteriorly, the parts remaining in situ. "After the removal of the tumor an immense hole, of a semilunar form, in the cul-de-sac of the vagina, through which we could look for three or four inches up into the peritoneal cavity and observe the movements of the viscera at each respiratory act." The wound was closed in the usual way with silver sutures. (Plate XXIV.) Severe peritonitis followed; recovery. (Marion Sims.)

Dr. Sims thinks his plan of amputating the sub-vaginal cervix in ordinary cases by cutting off each labial segment separately (splitting them previously from one another by lateral incisions) is followed by less contraction of the uterine os, and is altogether a superior operation. For sub-vaginal uterine hyperplasms of any size the ordinary method, in my experience, is preferable by far, provided the subsequent tendency to extreme contraction of the cervical canal (complete occlusion in some instances) is guarded against.

Whether, as a rule, pelvic abscess should be allowed to find a spontaneous exit? or if punctured, where and when? are questions which to me appear for the most part, if not entirely, answered by certain unpublished experiences of Mr. Spencer Wells, alluded to in the following reply to my inquiries recently addressed to him on the subject. "I am quite sure I am within the mark in saying that I have tapped from twenty to thirty cases of pelvic abscess. I cannot recollect one death. I have known several cases of death where no puncture has been made—some of them very painful cases—when I had urged puncture and was overruled." Cases 18, 19, and 20 occurred under my own observation. The puncture, in my opinion, should be early, and per vaginam, as indicated in the above three cases. The vagina is the natural outlet for pelvic abscess, and an early puncture prepares the way and insures that the matter escapes in the right direction. The majority, if not all Mr. Wells's numerous cases were punctured per vaginam.

The cause of death after operations for the relief of menstrual retention is by no means clear, death having taken place under circumstances of much variety (*vide* Cases). The following communication from Dr. Greenhalgh bears strongly on this important question. "Four typical cases of menstrual retention have occurred in my practice, in all of which

I have punctured the uterus through the rectum with complete success. In all there appeared to be absence of the vagina—in one there was a re-accumulation which was again successfully evacuated in the same way. As she was suffering from far-advanced Phthisis, of which she died about six weeks after the last operation, no attempt was made to make a vagina. In another case the septum between the rectum and bladder was so thin that I considered such an attempt would be fruitless. In my two last cases, however, one aged twenty-two the other sixteen, at present in the hospital, I succeeded, after tapping, in making a vagina large enough to admit the finger. When I tap per rectum I am especially careful not to make continued pressure upon the hypogastrium with one or both hands, but to allow the secretion to trickle through the canula, which I withdraw when it ceases to flow, by which I avoid the ingress of air, which I consider most hazardous." (Compare with Case 1.)

There are numerous instances on record (Bernutz et Goupil) of fatal peritonitis from the bursting of one or both Fallopian tubes excessively distended by fluid analogous to the menstrual secretion. Some of them *after the apparently* successful evacuation by puncture *per vaginam* of the menstrual distended uterus. For the latter, puncture of the tubes per rectum has been suggested. This proceeding, if feasible, which is highly improbable considering the doubtful character of the diagnosis, would almost to a certainty be followed by fatal peritonitis consequent on further effusion through the wound left by the trocar. Anatomically the arguments are obviously decisive against the adoption of any such suggestion. The question whether to what extent this quasi-menstrual accumulation can take place in the tubes, independently of the uterus, is still in abeyance.

No surgical proceeding whatever, touching any part of the uterine system, should be unattended by the precautions observed in operations of a grave character there or elsewhere; in certain states of the general system unforeshadowed by any recognizable peculiarity, the most trivial operation has been speedily followed by fatal peritonitis.

Well attested pelvic hæmorrhoidal angioms (Richet) often give rise to symptoms referable to certain morbid states peculiar to the uterus. Angiomas of this description never are relieved; on the contrary, are commonly aggravated by the absurdly complicated armamentarium uterinum with which the latter, even in these days, are too often wrongly, as well as ineffectually assailed.

Uterine flexions are curable only by means which restore to their natural relative proportions the uterine body and neck, and this no sort of instrumentation yet invented tends to effect directly or indirectly. The internal uterine stem is not only in general a failing, but a very dangerous agent, for reasons above given; the same objections apply in regard to the use of the uterine stem as a uterine irritant in amenorrhœa; one single instance of loss of life (and there have been many) from their use outweighs every argument in their favor.

The most intractable forms of uterine and vaginal occlusion have followed the use of destructive caustics per vaginam.

A vast proportion of maladies referred to the uterus are moral, mental, or marital (some of them scrofulous). Such are not only rebellious (their real causes being overlooked) to instrumentation, but are aggravated as well as protracted by any sort of treatment of that character.

The majority of uterine affections really local, that is, not constitutional, depend on an unwholesome condition of the inner surface of the uterine, not the cervical cavity, or morbid antagonism between the uterus and cervix, one or both often cured by simple dilatation of the latter.

Fig. 1

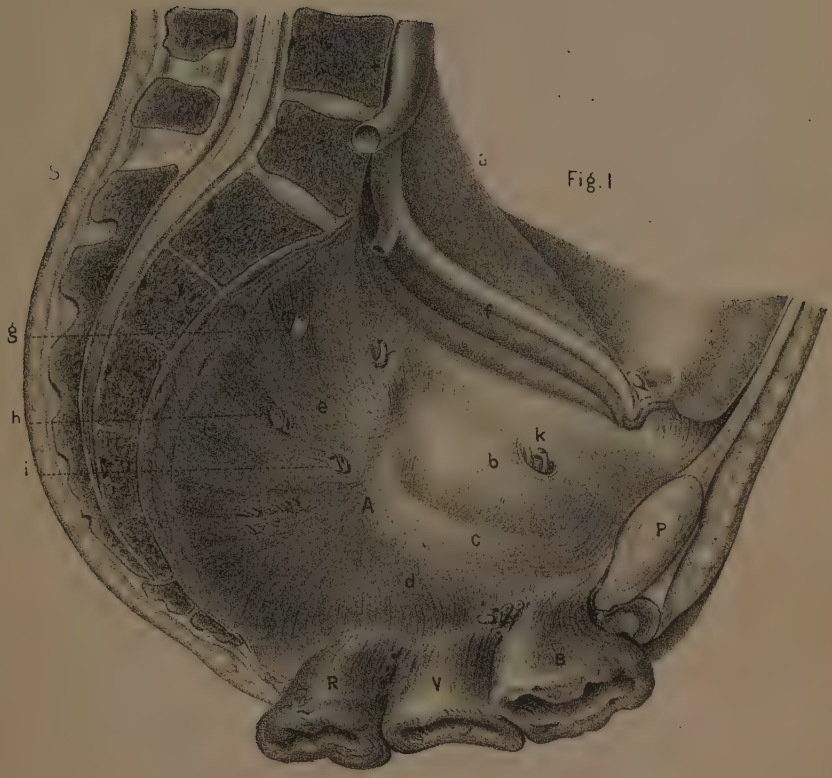


Fig. 2.

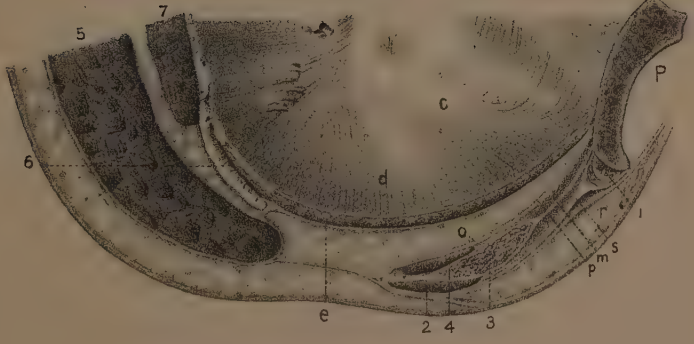


PLATE XIV.

FIG. 1.

Fascial Coverings of the Muscular Floor of the Female Pelvis.

B, *Bladder.* V, *Vagina.* R, *Rectum.* P, *Pubic symphysis.* S, *Sacrum.*

a, Cut edge of peritoneum and fascia covering the psoas muscle. b, *Obturator fascia.* c, *Ilio-pubic* line of junction of the obturato-coccygeal fascia; d, with that fascia which, as recto-vesical, descends to be reflected on the bladder, vagina, and rectum. e, *Pelvic fascia* covering sacral nerves and vessels. f, *Iliac fascia* covering sheath of iliac vessels. g, *Gluteal vessels.* h, *Ischiatic vessels.* i, *Internal pudic vessels.* k, *Obturator vessels.*

FIG. 2.

Perpendicular Section, from below upwards, to the left of the Pubic Symphysis, dividing the Labium through the middle of the Pudendal Sac.

P, Section of body of pubic bone.

c, Pubo-ischiatic line of junction between pelvic fascia and obturator fascia. *d*, Recto-vesical fascia and the obturato-coccygeus muscle. *e*, Inferior fascia of the same. *p*, Posterior aponeurosis of the perineal septum. *m*, Anterior aponeurosis. *s*, Under layer of superficial perineal fascia. *o*, Ischio-rectal extension of *r*, mass of fatty tissue filling the pudendal sac, and receiving the termination of the round ligament, fatty layer of superficial perineal fascia; its connection with that which fills the posterior perineal space.

1, Sheath of deep layer of superficial fascia for the crus clitoridis and its erector muscle. 2, *Superficial transverse perineal muscle.* 3, *Bulb of vagina.* 4, Lower muscular fibres of perineal septum extending between *p* and *m*. 5, *Gluteus maximus muscle.* 6, *Ischio-sciatic ligaments.* 7, *Pyriformis muscle.*

The recto-vesical fascia must be carefully left untouched in the lateral operation of lithotomy. (Pl. XIII.)

The floor of the pelvis near the rectum is thin and less resisting than in front, and yields more readily to the passage of matter from pelvic abscess fused in that direction.

Fig. 2.

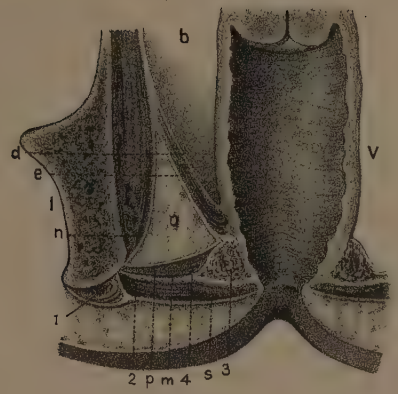


Fig. 1.

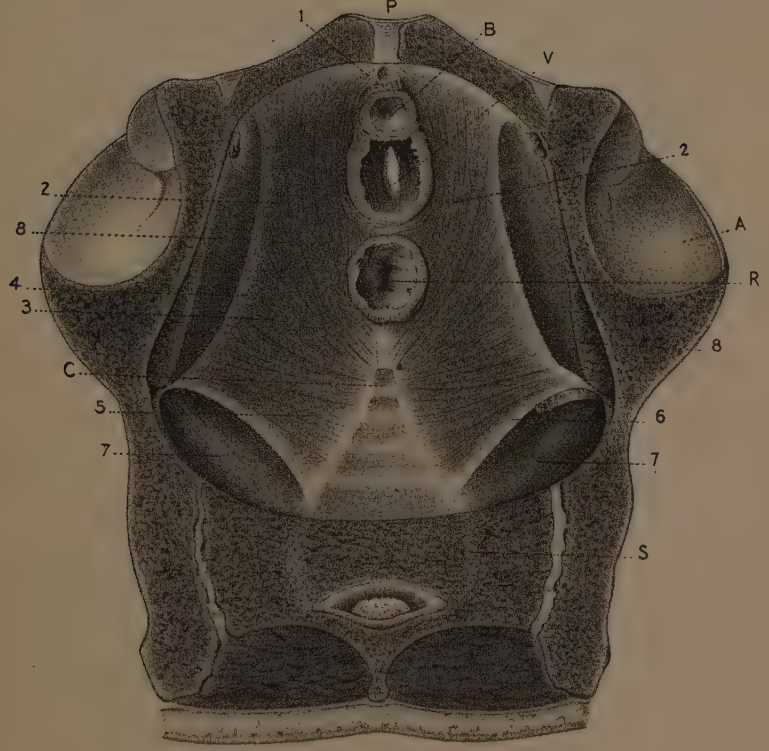


PLATE XV.

FIG. 1.

Muscular Floor of the Pelvis denuded of Fascial Coverings.

B, *Neck of bladder.* V, *Vagina.* R, *Rectum.* P, *Pubic symphysis.* C, *Coccyx.* S, *Sacrum.* A, *Acetabulum.*

1, *Anterior vesical ligaments.* 2, *Pubo-coccygeal muscle.* 3, *Obturator-coccygeal muscle.* 4, Ilio-pubic line of origin of the latter. 5, *Ischio-coccygeal muscle.* 7, *Pyriformis muscle.* 8, *Obturator muscle.* (Pl. I.)

FIG. 2.

Perpendicular transverse Section of Pelvis through the middle of the Vagina.

V, *Vagina,* and its posterior column. O, *Ischio-rectal fossa,* and fatty process of the superficial perineal fascia occupying the posterior perineal space. I, *Ischium*—tuberosity—section of. b, *Inferior pelvic space.* d, *Recto-vesical* layer of pelvic fascia passing from the pelvic surface of the obturato-coccygeus muscle to the vagina. e, *Inferior or perineal* layer of obturato-coccygeus fascia. n, *Inferior obturator fascia.* *p*, Posterior aponeurosis of the perineal septum. m, *Anterior aponeurosis* of the same. *s*, Deep layer of superficial perineal fascia covered by fatty superficial layer. 1, Cross section of right crus clitoridis, and of the erector clitoridis muscle. 2, *Superficial transverse muscle,* and section of *bulbo-cavernosus muscle.* 4, *Muscle of the perineal septum.* 3, Section of the *bulb of vagina.*

Fig. 2.

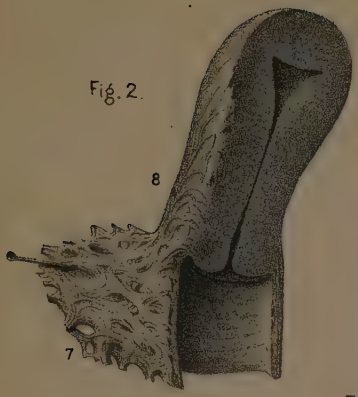


Fig. 3.

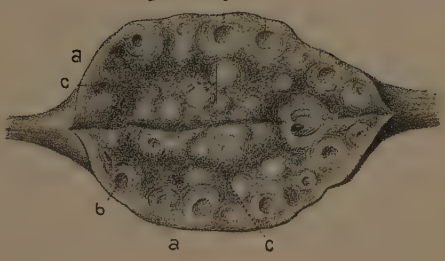


Fig. 1.

PLATE XVI.

FIG. 1.

Nerves of the Unimpregnated Uterus, from Hirschfeld, with the Nerves of the Clitoris added.

PERPENDICULAR section of the uterus, from before backwards; in front, through the body of the pubis to the right of the symphysis; behind, through the ilium, about half an inch to the right of the sacro-iliac joint. The right side of the pelvis removed, the sub-peritoneal tissue and vessels carefully picked out, the piece during the process being again and again moistened with very dilute nitric acid.

1, Hypogastric plexus (infer. aortic plexus) lying on the bifurcation of the abdominal aorta. 2, Rectal br. of the inferior mesenteric plexus, receiving constant br. from the division of the hypogastric plexus of the same side. 3, One of the lumbar ganglia of the sympathetic, all of which give br. to the hypogastric plexus. 4, 4, Spermatic plexus, derived from the renal and upper aortic plexus; it supplies the Fallopian tube, the ovary, and upper part of the uterus. 5, Br. from the third and fourth sacral nerves, assisting the foregoing to form, 6 and 7, the right inferior hypogastric plexus. Ganglia, cervical ganglia (Robert Lee), which are not found in any part of the hypogastric plexus (1), are constantly met with at the points marked 6 and 7. 8, Uterine filaments. The lower part of the uterus is supplied by anterior br. from the inferior hypogastric plexus; the middle by distinct prolongations from the hyp. plex. (infer. aortic (1)); the fundus by the spermatic plexus, and filaments from the two former sources. 9, Vesical plexus and br. 10, Trunk of great sciatic n. 11, One of the muscular br. (levator ani br.), from the fourth sacral nerve. 12, Trunk of pudic nerve. 13, Continuation of the latter into dorsal nerve of the clitoris.

R, Rectum. *U*, Uterus. *B*, Bladder. D. Trans. perinei m. cut across. 5, Section of the ilium.

FIG. 2.

The Uterus and upper part of the Vagina detached, to show more of the character of their nervous distribution.

FIG. 3.

Ordinary appearance of a Virgin Ovary, divided longitudinally through its middle, nearly down to the Bulb.

a, White cortex (albuginea) of the ovary. *b*, *b*, Ripe Graafian vesicles, collected, as they usually are at this stage, towards the convex surface of the gland. *C*, Stroma of the ovary, generally of a deep red color, produced by myriads of fine arterioles, which proceed in a direction from the bulb towards all points of the circumference. Indications, at the deeper part of the section, of unripe ova or vesicles, of which the ovary contains multitudes, but no definite number, at various stages of development.

What is at present known, or rationally conceivable in regard to the uterine nervous system, is founded on evidence direct and inferential, the former becoming more and more preponderating almost daily.

The nerve axis cylinder, formerly looked upon as homogeneous and indivisible, has been shown to be composed of primitive fibrillæ of almost unmeasurable minuteness. Every primitive fibre of striped muscle has its own nerve fibril terminating within it, or upon it; the same is the case with the fibres of smooth muscle when the nerve fibril has been traced to the cell nucleus (even on to the nucleolus—some authors).

The nerves of sentient surfaces follow the same rule; innumerable fibrillæ make their way certainly among the epithelial cells, if they do not indeed penetrate them.

Glandular secreting surfaces are as richly supplied with nerve fibrillæ, having special relations to the secreting cells; nerve-endings have been traced into glands in numbers proportionate to their functional activities, as plexuses coating the basement membrane of the acini. Whether the fibrillæ given off from these plexuses end in special cells (Langerhaus), or passing through the basement membrane end in the secreting cells (Pflüger), is not yet decided.

Before giving off their nerve-endings the nerves of the sympathetic system form delicate networks, having microscopic ganglia at their nodes —the submucous ganglionic plexus (Meissner), the nervea of older anatomists, extending along the entire intestinal canal from the stomach to the anus; also the plexus mesentericus (Auerbach), situated between the circular and longitudinal muscular fibres of the intestine to the same extent. The latter, at least, exist in all blood-vessels with muscular walls.

Parts which are the seat of special sensation possess nerve-endings in special forms—tactile corpuscles (Wagner, Meissner), terminal bulbs of Krause—the Pacinian bodies; the presence of the latter on surfaces not tactile (peritoneum) is still a mystery.

Two very dense webs of the most delicate nerve fibres are to be found under the dermic epithelium—one deep, one terminal, the latter only

covered by two layers of cells. The same arrangement exists in the conjunctiva, mouth, and vagina—sometimes with, sometimes without the corpuscles of Langerhaus (Klein). The hair bulbs are surrounded with a dense network of the same kind (Klein).

These ganglionic plexuses (Meissner and Auerbach) are now found in the human and mammalian uterus ; in the connective tissue around and in the submucosa of the vagina; in the corpora cavernosa and submucosa of the clitoris; in the bladder; in the substance of the heart—in short, in all involuntary muscles.

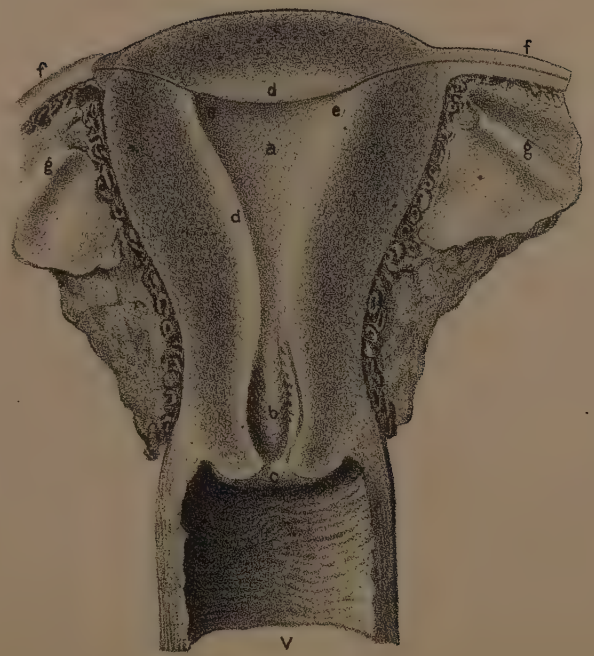
Structures allied to the terminal bulbs of Krause exist in the glans penis and glans clitoris, especially the latter, as well as in the sensitive parts of all mucous membranes and skin.

Meissner's tactile corpuscles and Pacinian bodies are found as appendages to the nerves of various parts of the genital tract—*e.g.*, inner surfaces of the labia majora, vagina, and vulva. As a rule these bodies are not papillary, a loop of blood-vessels is rarely to be seen in any of them.

The greater part of the so-called neurilemma of the uterine sympathetic system consists of Remak's filaments; the impression of the discoverer that these were essentially nervous structures or necessary components of such nerves is steadily gaining ground. Remak's filaments, at all events, are marked constituents of the uterine nerves. Dissections where they have been removed contrast strongly with those where they have been left; so much so, that those opposed to Remak's opinions, probably unsuspecting the fibrillar character of that which appeared to them a nerve cylinder terminal and indivisible, appeared inclined to claim for the uterus at least an independent vitality in which nerves had little or no share.

Nerves have been demonstrated in every part of the uterine system, except the lining membrane of the uterus; if the uterine glands possess no nerves they perform a conspicuous function short of an element which is essential to every such function elsewhere.

Fig. 1.



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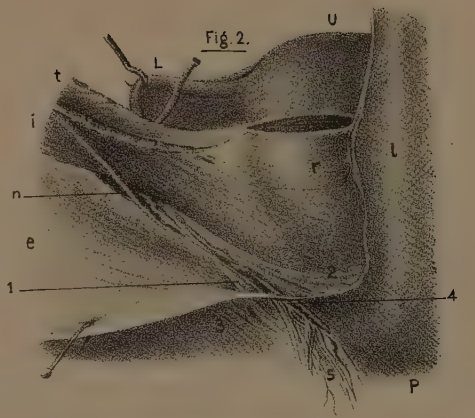

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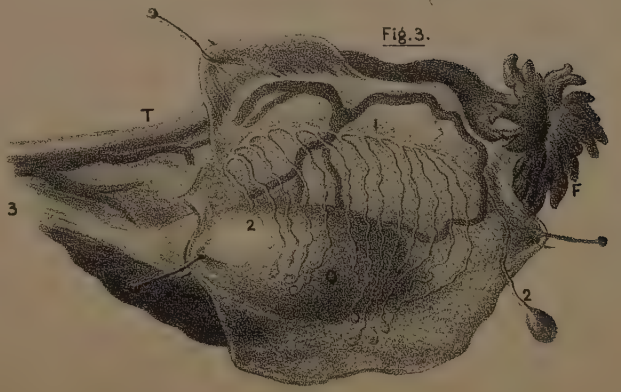


PLATE XVII.

FIG. 1.—*Natural Size.*

Median section of the Uterus, from side to side, through the Fallopian Tubes. Broad ligaments cut off where they begin to expand at the sides of the pelvic cavity. Mode of junction of Vagina and Uterus.

a, Uterine cavity. *b*, Canal of the cervix, and the peculiar folds of its lining membrane. *d*, Internal uterine (mucous?) coat. At its thickest parts it makes up one-eighth at least of the thickness of the part of the uterine wall it covers, thinning off as it approaches the inferior angle of the uterine cavity (Os internum), where it loses its distinctive characters, and passes into the lining membrane of the cervix. *c*, Os externum uteri. *e*, Uterine aperture of the canal of the Fallopian tubes, scarcely admitting the finest bristle. *f*, Fallopian tube near the uterus, where it is firm and cord-like. *g*, Round ligament. The anterior layer of the broad ligament dissected off from the posterior to show the position of the uterine vessels, between its two layers along its outer border.

V, Vagina, its mucous coat reflected over the os uteri; its outer coats, prolonged on to the uterus, becoming gradually lost in its outer surface. (Uterus, Pl. XIX.)

FIG. 2.

Pubic Termination of the Round Ligaments.

P, Pubis, where covered by the pubic portion of the aponeurosis of the int. oblique m. *U*, Fundus uteri. *L*, Uterine extremity of the round ligament.

e, Aponeurosis of the Ext. obl. m. *i*, Int. oblique m. *t*, Transversalis m. *r*, Rectus m. *n*, Genital br. of genito-crural nerve.

1, External terminating fibres of Round Lig. into the outer pillar of the int. ring near Gimbernat's lig. 2, Int. term. fibres into the conjoined tendons of the int. obl. m. and trans. m., near the pubis. 3, Middle term. fibres into the upper part of the ext. ring. 4, Internal pillar of the ext. ring. 5, Vessels of the round ligament; nervous filaments and middle terminal fibres of the round ligament descending into the pudendal sac.

FIG. 3.

Contents of the Alar Mesentery, the Genital Gland (Ovary), and Appendages—viz., Fallopian Tube and Organs of Rosenmüller, or Female Epididymis.

T, Fallopian tube or developed duct of Müller; the vesicle, here absent, but often seen attached to one of the fimbriæ, is the remnant of the cæcal end of the duct in its fœtal state. 1, Remnant of the Wolffian duct. 2, 2, Remnants of the upper and lower sets of the cæcal tubes of the Wolffian body. The middle set of cæcal tubes are usually seen converging to the hilum of the ovary where they appear to enter. The pedunculated vesicle, apparently the last of the upper set of tubes, is the remnant of the cæcal end of the Wolffian duct. 3, Utero-ovarian ligament. *O*, the ovary.

In the male, the organ of Rosenmüller becomes the epididymis; the upper set of cæcal tubes are reduced to hydatiform swellings; the lower set appear as the vasa aberrantia; the middle set become the coni vasculosi; the Wolffian duct is now developed into the vas deferens; and the duct of Müller is seen as an atrophied remnant, presenting sometimes minute cystic swellings in its course, lying along the anterior border of the epididymis; its cæcal end projecting from its head is now the "hydatid of Morgagni."

The contents of the alar mesentery are exactly homologous with the contents of the scrotum.

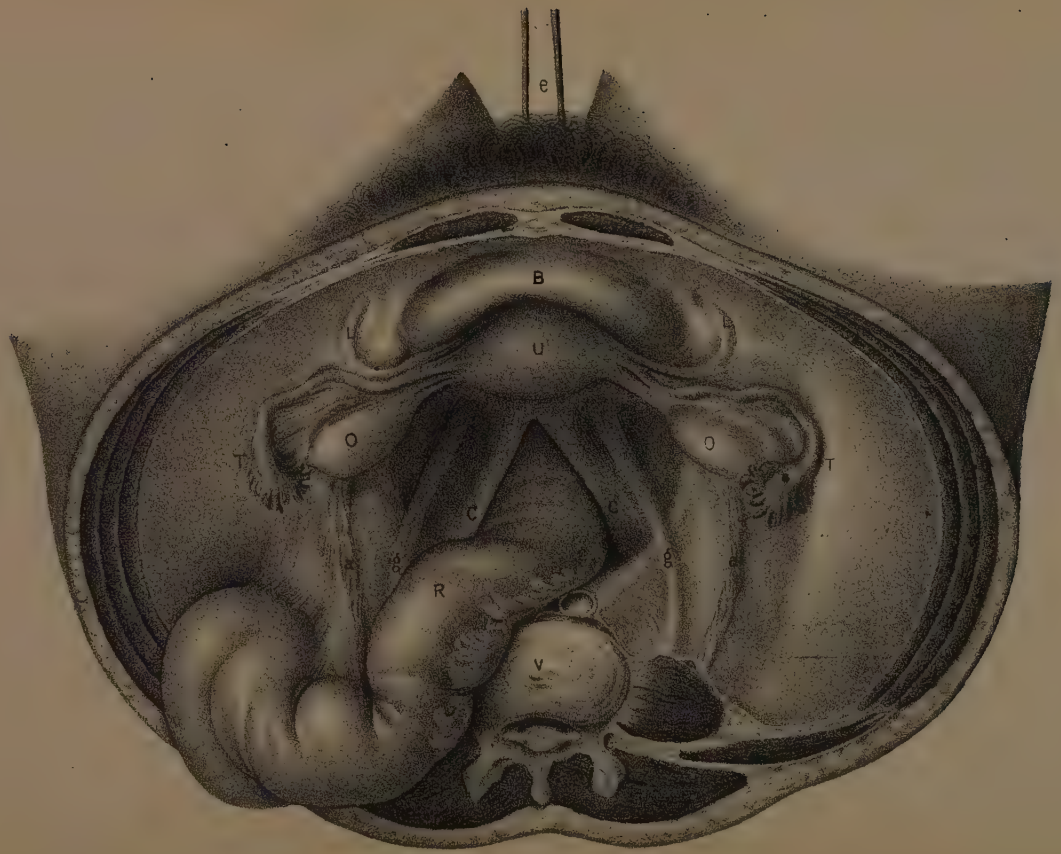

e
B
U
O
O
T
T
C
C
g
g
R
V

PLATE XVIII.

Mechanism of the Structures supporting the Uterus and opposing its Displacements.

Horizontal section of the abdomen on a level with the upper edge of the ilium on each side.

The uterus, drawn down through the vagina by means of a vulsellum attached to its neck. Moderate traction, as much as possible in the direction the uterus would take, in the early stage of ordinary prolapsus, was continued until it seemed to threaten some physical damage to the structures now more strongly opposing its further descent. The parts concerned exposed to view, as shown in the Plate, assumed the following relative bearings:—

B, Bladder, depressed and compressed towards the pubis by *U*, Uterus, which has descended about an inch and a half. *C*, Utero-sacral ligaments, having lost their natural curve round the fore-part of the rectum, diverge, and become straight, from being forcibly stretched between their attachments. *O*, Alar mesentery and contents pulled forward and slightly depressed. *L*, Round ligament, curved round (but not on the stretch) in following its uterine attachments. *g*, Ureter. *a*, Spermatic vessels somewhat more prominent under their peritoneal covering. No sign of strain whatever on either the broad or round ligaments.

The utero-sacral ligaments having been divided transversely, the uterus yielded rather suddenly about another inch. Before examining the new obstacle which now prevented its further progress, the pelvis was divided perpendicularly, and from before backwards. *Vide* Pl. XIX., Fig. 1.

Fig. 1.

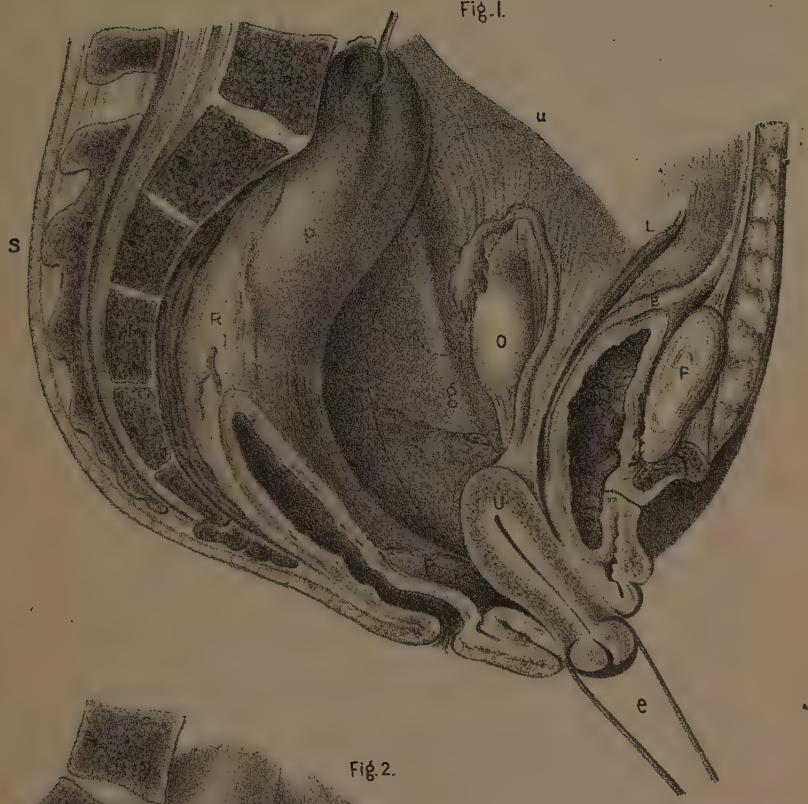


Fig. 2.

Fig. 3.

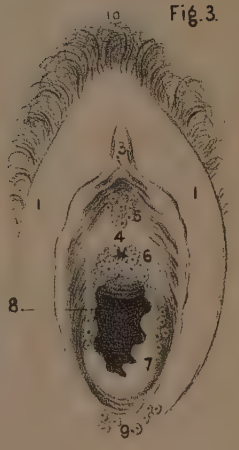


PLATE XIX.

Fig. 1.

The left half of the pelvis, and corresponding half sections of the *B*, Bladder, *U*, Uterus, and *R*, Rectum. *P*, Pubic symphysis. *O*, Ovary. *T*, Fallopian tube. *L*, Round ligament. The three latter still in their natural relations with the broad ligament, which is seen on the stretch, pulling strongly on the margin of the pelvis. The bladder drawn down with the uterus, owing to the intimate connection between the two. The rectum is not disturbed; the anterior layer of its sub-peritoneal cellular sheath (*p*) retains a much weaker hold of the vagina than exists in the case of the bladder, vagina, and uterus. The uterus is seen half out of the vulva, retained only by the broad ligament, which, when divided or stretched sufficiently, removes the last obstruction to complete prolapsus of the organ.

After the uterus came down a further inch, as the result of dividing the utero-sacral ligaments, some retaining agent, other than the broad ligaments, still prevented its arrival at this last stage, as above described. The obstruction was found to be due to the sub-peritoneal pelvic cellular tissue, particularly where it surrounds and accompanies the uterine blood-vessels. (Pl. XIII.) This tissue is here strengthened by additional trabecular filaments, so disposed as to support the vessels, and defend them from the effects of a sudden strain incidental to the various movements of the body, more especially in cases of uterine enlargement.

Complete prolapsus was effected only after the yielding of pelvic reflections of the broad ligament. This occurred from behind forwards, the round ligament being the last put on the stretch.

U, Outline of the position of uterus before the commencement of the experiment.

Fig. 2.

State of Parts in Uterine Retroversion.

O, Ovary. *U*, Uterus, inclined backwards to show the action of *L*, the round ligament and contiguous segment of the broad ligament. *R*, Rectum. *p*, Rectal portion of the utero-rectal fold. *B*, Bladder. P,

Pubis symphysis. *V*, Vagina. *S*, Sacrum. *C*, Utero-rectal peritoneal fold, passing into the left utero-sacral ligament.

In retroflexion of the uterus, the body of the organ would of course occupy the position here indicated, but without any strain upon the utero-sacral ligaments.

Anterior deviations of the uterine body are generally anteflexions.

Fig. 3.

The vulva in outline, to show the situation of the vulva muciparous follicles or glands.

1, Labia majora. 3, Clitoris. 4, Urinary meatus. 5, 6, 7, 9, Collocation of vulvar glands. 8, Vaginal aperture and hymen.

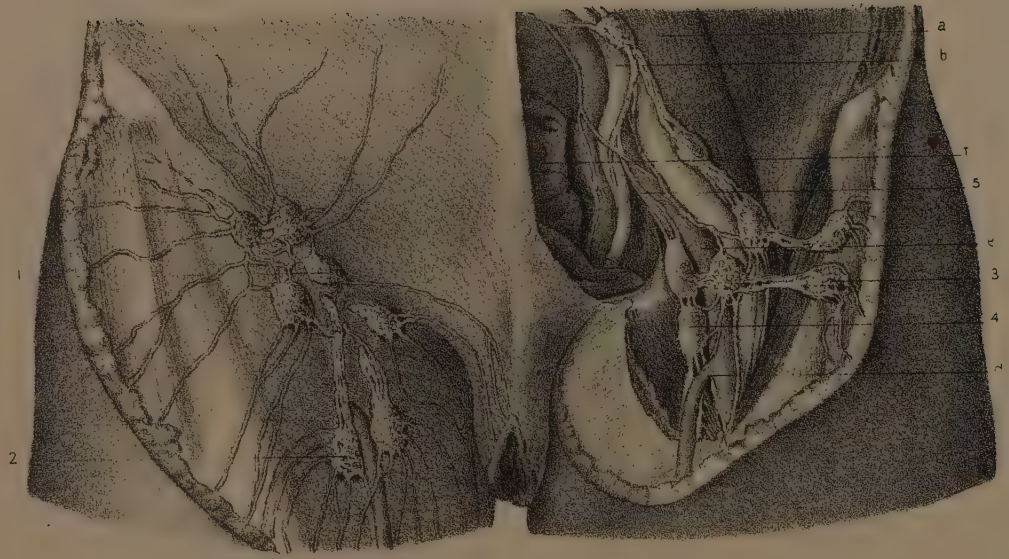
The circular marginal attachments of the hymeneal membrane, when the caruncular fissures do not reach the vagina, leave a ring of unnatural constriction round the vaginal orifice, which generally requires a special operation. (Pl. II.)

Permanent cure of uterine prolapse depends chiefly on the elastic qualities of the sub-peritoneal pelvic tissue. The latter always retains its relations with the displaced organs as well as with the pelvic vessels; owing to the slow progress of uterine prolapse it yields to an enormous extent in such affections; but the fibro-elastic elements in its structure will very often enable it to return eventually to its normal condition, if relieved for a sufficient period from the weight of the prolapsus.

The alar mesentery takes no part in the support of the uterus. (Pl. XIII.)

When the uterine body descends into the sacral hollow beyond the utero-sacral ligaments, the latter oppose its reduction, particularly when the organ suffers the usual consequence of such displacement—viz., a notable enlargement.

The narrowing, by plastic operations, of the vagina at the best tends only to keep the uterus out of that canal; they are effective according to the site chosen for that operation. Dr. Sims prefers the upper part of the vagina. (Pl. XXII.)


a
b
1
2
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4
5

PLATE XX.

DIAGRAM.

THE PROPORTIONS REDUCED FROM MASCAGNI, CRUIKSHANK, AND HUNTER.

Superficial Pubic and Inguinal Lymphatics and Glands.

1, Superficial lymphatic glands of the groin, receiving superficial lymphatics of the lower half of the surface of the abdomen and upper and outer part of the thigh, the lymphatics of the vulva, and the communicating lymphatics from the saphenous lymphatic glands. 2, Saphenous lymphatic glands, receiving superficial lymphatics from the upper and inner part of the thigh. 4, Deep inguinal glands, receiving the deep lymphatics accompanying the femoral vessels and some of the superficial lymphatics of the thigh. 3, Superficial inguinal glands communicating with 4 through the fascia lata. 5, External iliac lymphatics.

a, Psoas muscle. *b*, Common iliac artery and vein where they bifurcate. *c*, Internal iliac artery and vein. *d*, Saphena vein. *f*, Rectum.

PLATE XXI.

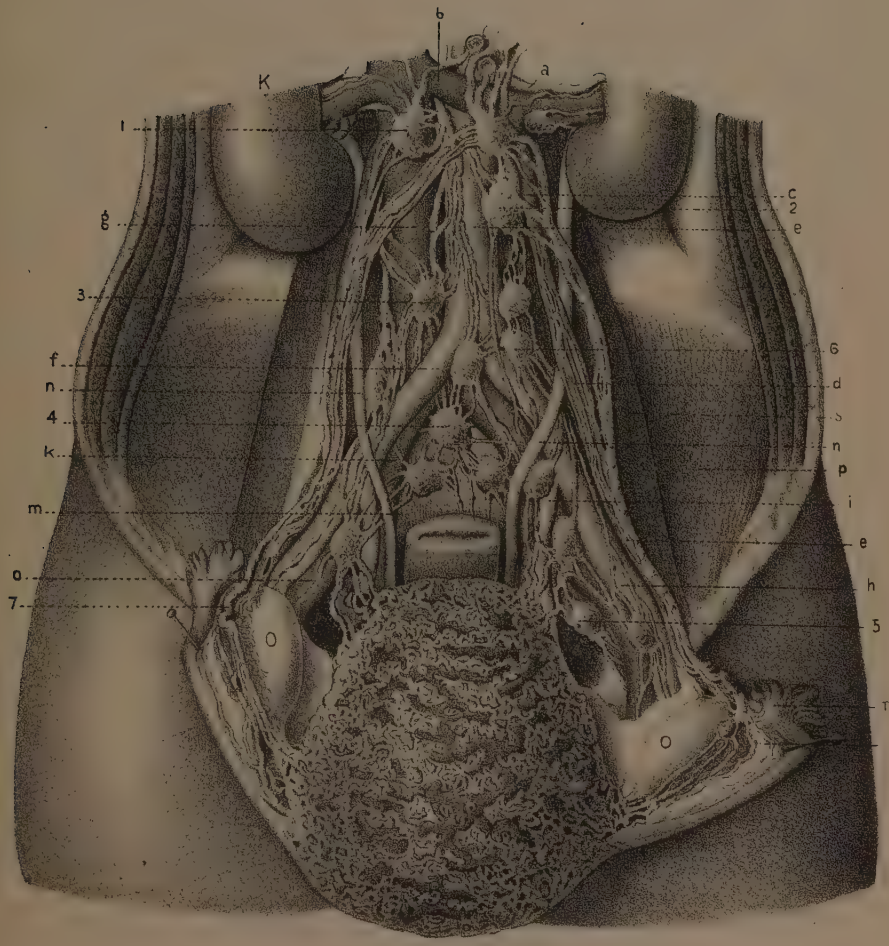


PLATE XXI.

DIAGRAM.

THE PROPORTIONS REDUCED FROM MASCAGNI, CRUIKSHANK, AND HUNTER.

The Lumbo-iliac Lymphatics and Glands. Lymphatics of the Gravid Uterus and Appendages.

1, 2, Superior lumbar glands, receiving the upper or spermatic set of lymphatics from the uterus and appendages, some of the renal lymphatics, some of the lacteals, and the efferent communicants from the, 3, inferior lumbar glands, which receive the efferent lymphatics from the sacral and iliac glands. 4, The sacral lymphatic glands, receiving lymphatics from the iliac glands and the lymphatic communicants from the *very abundant* lymphatics of the rectum. 5, External and internal iliac glands (Pl. XX.). 6, Common iliac glands, receiving inferior uterine lymphatics and communicating lymphatics from, 5, 7, spermatic lymphatic plexus, the uterine portion of which generally appears as a separate large lymphatic trunk.

a, Left renal vessels, covered by some ascending lymphatic efferents, which join the common duct higher up. *b*, Left renal vein resting on the termination of the lumbar efferents into the *Receptaculum Chyli*. *c*, Left spermatic vein. *d*, Left spermatic vessels covered by their lymphatic plexus. *e*, Aorta, having the roots of the receptaculum on the right (generally on the left) and beneath the aorta. *f*, Common iliac trunks. *g*, Ascending cava. *h*, External iliac artery and vein. *m*, *n*, Ureters. *o*, Right common iliac vein. *p*, Iliacus muscle. *s*, Psoas muscle.

O, Ovary reversed to show lymphatics between it and its bulb.

Cases.—1. Lymphangiotis and Lymphthrombus in a puerperal uterus involving the lymphatics of the Fallopian tubes and ovaries. Enormous enlargement of these vessels, which were filled apparently with pus. 2. Lymphangiotis and venous thrombus of the uterus five days after parturition. The enlarged lymphatics conspicuous under the peritoneal coverings, which it was not necessary to remove to bring the result of the morbid process into view. (Cruveilhier, Path. Anat. Livr. XIII.)

Fig. 1.

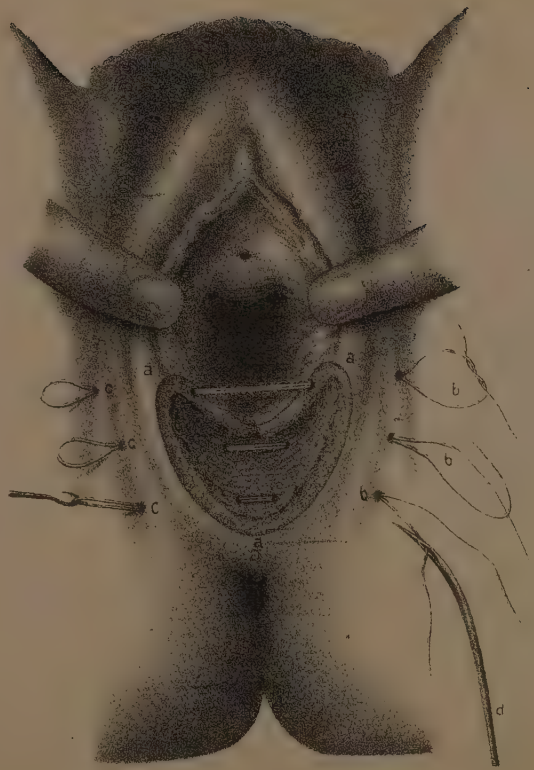


Fig 2.

PLATES XXII., XXIII.

Illustration of the chief varieties of Perineal Plastic Surgery for the radical cure of complete Prolapsus Uteri and Lacerated Perineum.

As no part of the vulvar perineum (anterior perineal triangle) is concerned in this affection, plastic union of any part of it will contribute nothing to the result of any operation. The prolapse always follows the same course as a fœtal presentation, and, in a degree modified by its slower progress and softer construction, produces the same effects on the ano-vulvar perineum. Thus, the prolapse is attended by structural changes in the latter which resemble those caused by parturition; the chief difference being, that after parturition the perineum rapidly regains its natural state, whereas in uterine prolapsus, from the long-continued operation of the cause, the above temporary condition becomes a permanent abnormal state.

The ano-vulvar perineum, in a prolapse of long standing, presents itself,—1. As a segment of a thin, patulous bag, the perineal body being permanently distended in all directions. 2. As a mere edge of thin, atrophied recto-vaginal septum, the adjoining walls of the two canals having been brought together by long-continued pressure, so as to obliterate the triangular space between the two at their termination, and lessen the interval between the vaginal and rectal apertures. 3. As a long, irregular margin, the remnant of a parturient laceration.

Laceration of the perineum is never produced by uterine prolapsus, nor is the latter affection a *necessary* consequence of any kind of structural changes in the perineum caused by parturition.

The course taken by the presentation follows from first to last the curve of the sacrum, the ano-vulvar perineum yielding to allow it to escape in this curvilinear course, so that at the final moment the presentation makes its transit through the vaginal aperture in a plane approaching that of the inlet. To do this, the presentation has to make its final turn under the pubic arch, which it could not do without considerable yielding of the perineum.

Supposing the perineum uninjured, a uterine prolapse must also make its final turn, but only after working (in a measure) the perineal changes

above described. If, previous to this stage, the perineum has had long to sustain its weight, the prolapse belongs to the first category. If, having escaped, it has continued long unreduced, it belongs to the second. The third includes prolapse where the perineum has been injured by parturition.

Plastic operations for the radical cure of uterine prolapsus were first performed by Fricke. His plan consisted in removing the posterior margin of the vulva, not including any part of the vaginal mucous membrane. This plan failed for reasons above specified. The plan next in order is that of Geddings, who removed a strip of vaginal mucous membrane as well as the margin of the vulva; he, moreover, secured the coaptation of the entire denuded surfaces by quilled suture. The result was a success in cases not too extreme. Mr. Brown removed the mucous membrane only, having recourse also to the quilled suture, with about the same success. The Author's plan includes in the resection, all the redundant vagina at its ano-vulvar margin, in the first place; and in the second, the removal of a triangular portion of vaginal mucous membrane, the middle angle extending to some distance upwards along the posterior wall of the vagina, securing with quilled suture in the usual way. It is the only plan which appears effective in bringing together again at the ano-vulvar perineum the two ischio-perineal ligaments. It shortens, also, the elongated sacro-pubic line, contracts the ano-vulvar perineum to something approaching its natural dimensions, leaves ample vaginal aperture, although it causes the posterior segment of vagina to approach the pubis so as to offer an effectual obstacle to the prolapse *before* it can make the *final* turn under the pubic arch.

No perineum, natural or artificial, will long sustain the *direct* pressure of a prolapsus, hence the failure of the earlier operations, which, moreover, possessed the capital error of constricting unduly the vaginal aperture. But the eventual success of even this operation depends greatly on the amount of general vaginal narrowing which sooner or later is commonly induced by it, otherwise the uterus will be found still occupying the upper part of the vagina at least. As before observed (Pl. XIII.), keeping the uterus out of the vagina is primarily all that can be hoped for through any expedient, operative or instrumental. The choice of a pessary should be governed by the remarkable tendency on the part of the vagina to contract, as a sequel to any cause tending to set up irritations on its inner surface. For this reason, and for others already mentioned (Pl. XIII.), a pessary should be as small as possible, so as to keep its place without preventing the anterior and posterior vaginal surfaces from coming together. Incurable vaginal atresia has been produced by the injudicious employment of medicated plugs. (Pl. XIII.)

Dr. Marion Sims expresses his confident expectation that the objects above named will be at once and permanently obtained by bringing together the two lateral halves of a surface denudation made at the upper end of the vagina (in front of the cervix or behind it); extending the raw

Fig.1.

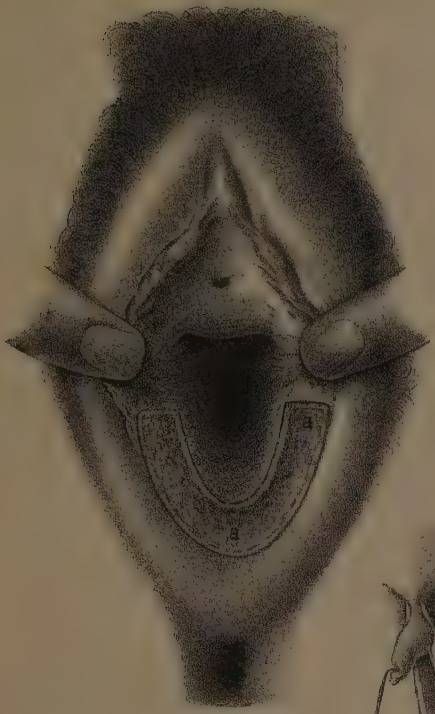


Fig.2.

Fig.4.

Fig.5.

Fig.6.

Fig.3.

surface downwards along the recto or vesico-vaginal septum, so as to cure, at the same time, recto or vesico-vaginocele, or both, as the case may be. He recommends a denudation of a triangular shape, the base next the cervix; but shape as well as size must obviously depend on circumstances varying more or less in every case. He prefers reducing the procidentia if present *first*, and proceeding afterwards as in Pls. XXIII., XXIV.; this creates an unnecessary difficulty. The final tightening of the silver sutures can of course be only effected with the parts in situ. (*Vide* Vagina, Pl. XIII.)

PLATE XXIII.—FIG. 3.

The os uteri and vesico-vaginal septum; a fistulous opening through the latter communicating with the bladder proposed to be closed by the operation.

FIG. 4.

The operator having carefully passed the fine hook into the mucous vaginal layer, proceeds to denude the margins of the fistula of that layer, manœuvring with hook and scissors to dissect off the circular portion of membranous layer in one piece, or at all events to obtain the proper amount of *surface* denudation.

FIG. 5.

The needle armed with double thread is entered at the outer margin of the proximal margin of the wound, at a distance from it, of about the width of the denuded surface, and brought out at its inner edge; the passage of the needle is facilitated by the counteraction of the hook. The double thread already passed indicates the mode of ensuring adhesion where the operation is apt to fail—viz., the corners of the wound.

FIG. 6.

The passage of the needle through the distal margin of the wound—a reverse of No. 4—ending in the establishing, for the suture, relations exactly the same for both margins.

Fig. 6.

Fig. 1.

Fig. 2.

Fig. 3

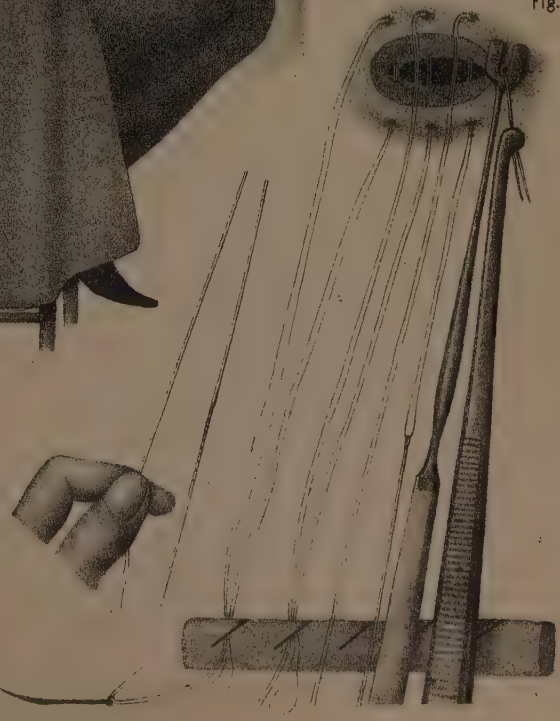


Fig. 4.

Fig. 5.

PLATE XXIV.

VESICO-VAGINAL FISTULA.

Fig. 1.

Position of the patient, operator, and assistant; the former on her left side, the left arm retained behind the back so as to permit the body to roll partly over on the chest, and elevate the nates; the legs and thighs are flexed, the right more than the left, so that both legs at the knee touch the couch. The assistant holds back the perineum with the retractor speculum to the extent and in the direction desired, from time to time, by the operator.

(See Plate XXIII., Figs. 3, 4, 5, 6, and description in text.)

Fig. 2.

Number and proximity of the sutures to one another in relation to the size of the wound.

Fig. 3.

The ends of each double thread, temporarily secured in succession, in as many oblique slits in a small cylinder of wood, from which they are subsequently released, one after another, to serve as conductors for the silver suture; the preliminary thread sutures having been threaded double, the loop is not knotted and no obstructive bulk is added to the slender irregularity where the silver wire is attached to it; the latter is drawn through the passage made by the needle as indicated by the finger and thumb to the left of the figure; any undue dragging on the margins of the wound all the while counteracted by the hook. Both ends are now firmly held at a short distance from their points of exit by the spring forceps, and placed in the slit in the cloven spatula, which is applied so as to prevent disturbance in the adjustment of the opposing raw surfaces, through the twisting up of the ends of the wire to complete the suture.

FIG. 4.

Aspect of the wound at a half stage of the process, described under Fig. 3.

FIG. 5.

Aspect of the wound, all the sutures being completed.

Vesico-vaginal fistula is usually the result of a sloughing process succeeding the destructive pressure of the fœtal head during childbirth. The size of the opening depends on the extent of the injury, its shape and character on the extent of the conservative inflammatory adhesive process around the destroyed tissues. The margin of the fistula is often a thick hard cicatrix, fixing the movable coats of the bladder to the vagina in a way entirely preventing urinary infiltration. If first seen long after the accident, the fistula, however large, is considerably reduced in size; the healing tendency of the parts is very great; a minute opening is occasionally all that is left of an originally extensive loss of tissue; more rarely there takes place complete healing—spontaneous cure: still there may remain a very large opening; the vagina may have lost its elasticity, so as to offer powerful resistance against the object of the operation. The vagina at the vesico-vaginal septum is comparatively inelastic, so the vaginal sac enclosing the fœtal head is composed chiefly of the other portions of it; at the moment of destructive pressure the wall at the septum is much distended in all directions, and consequently much attenuated; the lateral walls may touch the sides of the pelvis. Cases are recorded wherein they have remained glued to those points of contact, the adhesions there resisting the revival of vaginal contractility.

The fistulous opening may be established between the bladder and cavity of the uterine cervix or involve a part of the urethro-vaginal septum, or leave scarcely any septum at all. *One or both ureters may be involved when their truncated ends are seen pouring forth drops of urine, somewhere, at the distal margin of the fistula.*

Surgical records of this operation do not admit of the establishment of precise rules of practice in the presence of these not unfrequent complications. Whether or no the vaginal contractions or pelvic adhesions should be liberated by preliminary incisions; the os uteri closed and menstrual fluid be made thereafter to pass by the bladder; the uterine cervix detached from the bladder, and the fistula treated as an ordinary one; or the severed margins of the fistula brought together in a direction longitudinally, transversely, or obliquely; whether the material of the suture should be metallic or each alternate suture of thread (Toca, Madrid), or the suture quilled or shotted, the margin of the fistula split and

dovetailed, a shield and button used, the denudation marginal or a surface one, must still be left to the genius, taste, or better, the experience of the operator. The following rules appear to be justified by my own experience. I have myself repeatedly seen the most complicated cases cured *in one operation* after the manner above sought to be delineated.

1. The wound produced by the process of denudation should be as much as possible a surface wound; this is obviously most essential in cases of involved uterus. The reason for this is apparent; the vesico-vaginal septum if even thickened by adhesive inflammation would not allow otherwise of a sufficient extent of adhesive surface.

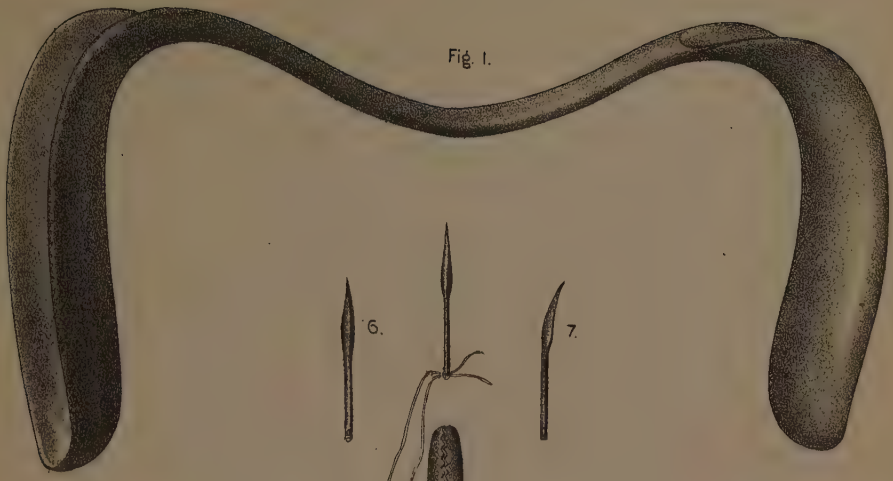
2. The sutures should be metallic, best of silver. No fistula, of any great size at all events, has ever been cured at one operation, if at all, by another material. Another untoward consequence of non-metallic materials which has repeatedly come under my own observation, is violent hæmorrhage into the bladder, which gets distended by an enormous clot; it has been necessary to open the wound and empty the bladder through it. I have had to assist in this proceeding.

3. The direction of the wound should, if possible, be transverse; the margins adjusted to a fine uniform line; if in the least "pursed," or the corners of it left without their special suture, the operation will surely fail.

4. In case of failure, partial or general, the wound must be dealt with as at first. It is not at all difficult to close, partially, a fistula, the edges of which can be brought together, but the remaining opening, perhaps scarcely perceptible, continues rebellious against innumerable attempts to close it unless absolutely cut out and the wound, now greater in proportion, treated on the principles above advocated.

5. With fistulæ of moderate size, carefully closed as above, the patient requires neither the constant catheter, nor the recumbent position (*vide* Vagina, Pl. XIII.).

Fig. 1.



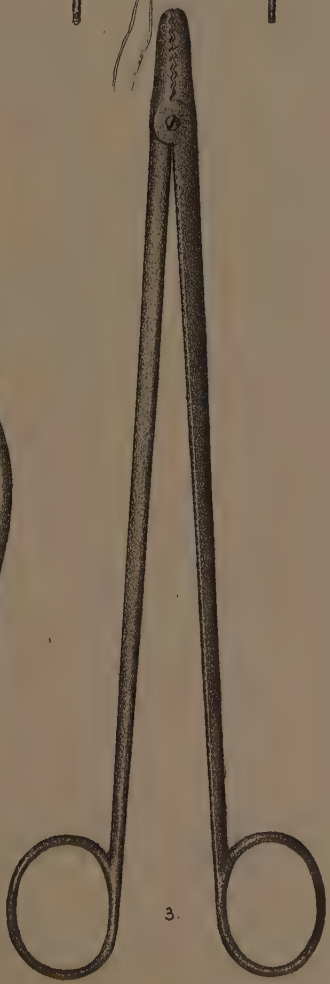


PLATE XXV.

Instruments used in the Processes figured under Plates XXIII. and XXIV.

Fig. 1. Retractor Speculum.
2. Fine Hook.
3. Needle Holder.
4. Spring Forceps, broad, slightly curved ends and roughed.
5. Constant Catheter.
6, 7. Needles, front and side view; the centre one armed with doubled thread.

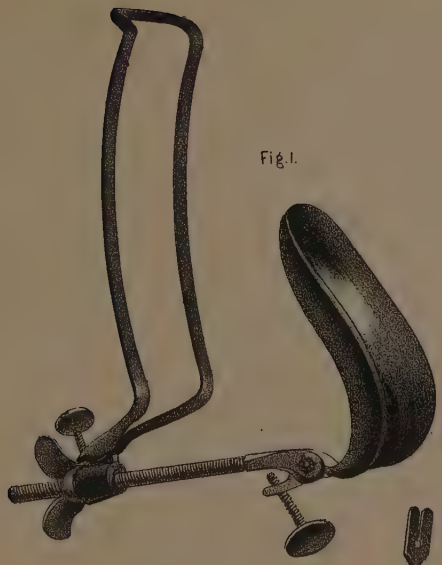


Fig. 1.

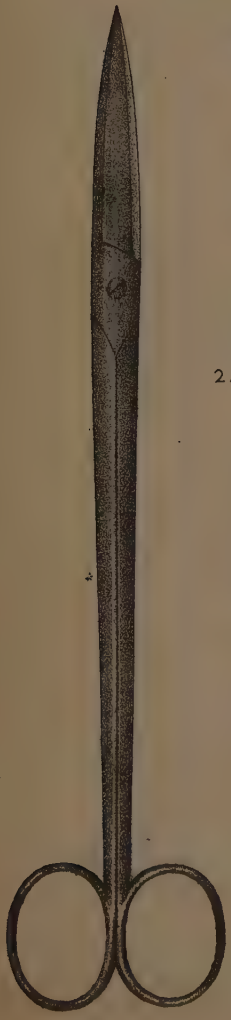


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PLATE XXVI.

Instruments used in the Processes figured under Plates XXIII. and XXIV.

Fig. 1. *Foveaux's retractor*, enabling the operator to dispense with the assistant. As made for the Author.— *Vide* Introduction.

The vaginal valve is made by a special screw to assume, within certain limits, any angle of inclination. The Sacral Fenestrum is made by its special screw to act in like manner; the distance between the two is regulated by a third (female) screw working on the male screw-connecting stem; a groove in the upper surface of the latter admits a small flat sliding piece, projecting downwards from the lower termination of the fenestral frame, thus providing for the easy play, to and fro (without lateral displacement) of the fenestrum. This ingenious contrivance can be adjusted to any pelvis in any position of the patient.

Another form, slightly modified, has since been made by Mr. Foveaux, in which a square male-screw-stem answers in place of the sliding piece and groove. Vaginal valves of various sizes are supplied with the instrument.

Fig. 2. Scissors.

3. Cleft Spatula, front and side view.

Fig. 1.

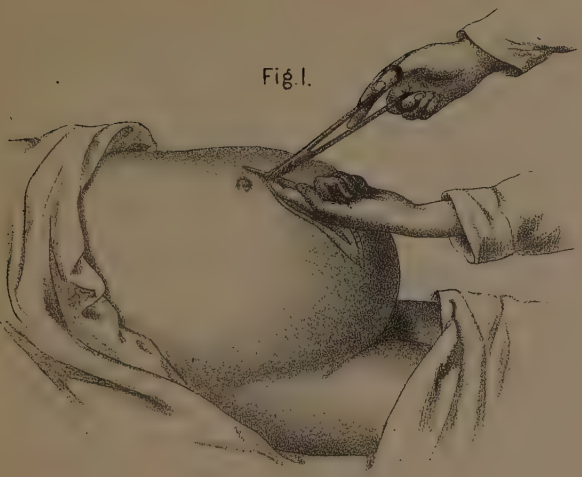

Fig. 2.

Fig. 3.

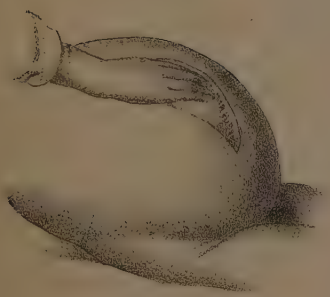

Fig. 4.

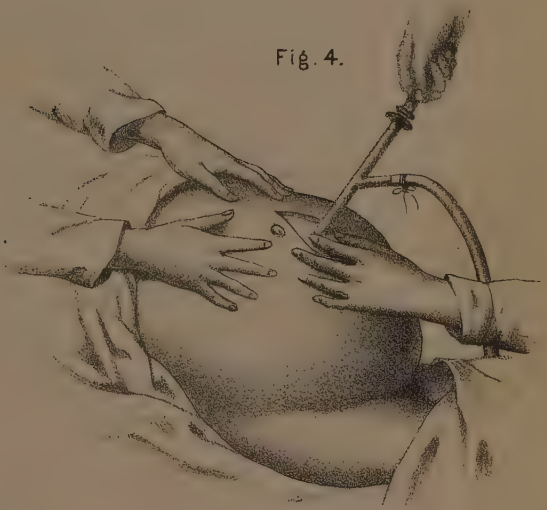

Fig. 5.

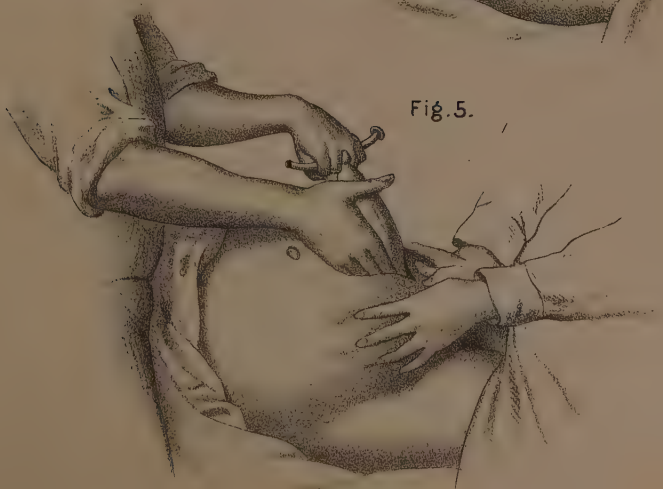

PLATE XXVII.

Removal of Tumors connected with the Uterus by Gastrotomy.

FIG. 1.

AN incision has been made through, and in the direction of, the linea alba, so as to disclose, not wound, the peritoneum; act of enlarging it with scissors guided on the forefinger.

FIG. 2.

Mode of opening the peritoneum, which is incised in the same direction and to the same extent, as the above preliminary incision on a conductor passed through the opening.

FIG. 3.

The operator, by means of his hand passed round about in various directions between the tumor and peritoneum, seeks to ascertain the extent and nature of adhesions, if any, between the two.

FIG. 4.

Act of tapping the tumor by means of a trocar and syphon canula.

FIG. 5.

Mode of securing the opening made by the trocar, to ensure, as much as possible, against the escape, from the evacuated cyst into the abdominal cavity, of any remains of its fluid contents, and to obtain a hold of it firm enough, without risk of rupture, to withdraw it, entire, through the wound. An assistant, by judicious pressure with both hands, attempts to favor the exit of the cyst, keep back the viscera, and neutralize the possible consequences of a too sudden subsidence of the previous distention; this manœuvre also tends to overcome the resistance through atmospheric pressure, not a mean agent, obstructing this part of the operation.

Fig. 1.

Fig. 2.

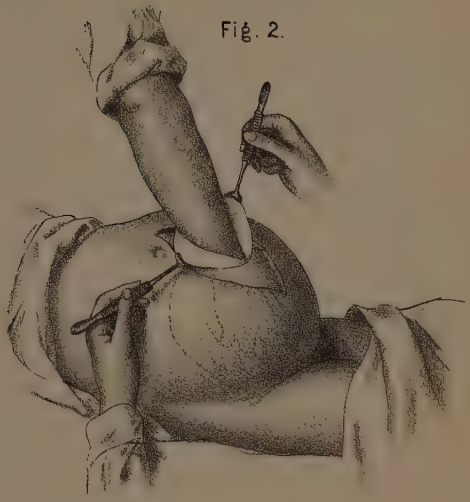

Fig. 3.

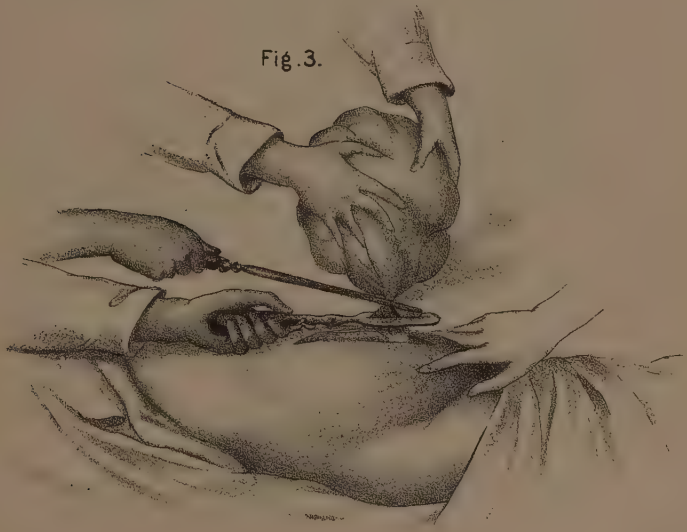

Fig. 4.

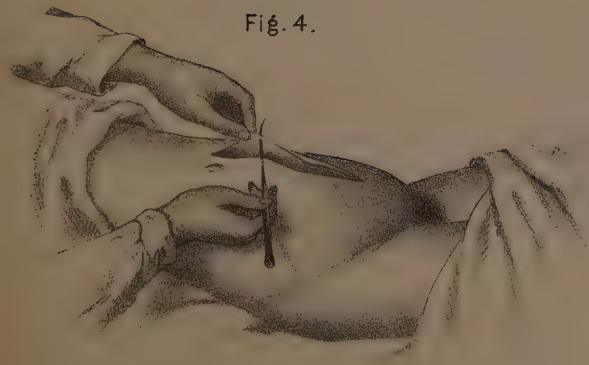

Fig. 5.

PLATE XXVIII.

Removal of Tumors connected with the Uterus by Gastrotomy.

FIG. 1.

THE operator is obliged to complete the process by the introduction of his other hand below the cyst.

FIG. 2.

The operator attempts to reduce the size of an imperfectly evacuated multilocular cyst by breaking the remaining cysts with his hand introduced into its interior. An assistant holds apart, by means of broad vulsellums or forceps, the margins of the dilated orifice made by the trocar; the prevention of any irruption into the abdomen of cystic fluid being all the while kept in view.

FIG. 3.

The tumor, eventually extricated, is held by an assistant in a manner to prevent undue dragging on the pedicle, which the operator encloses in a broad metal clamp, and divides by means of the actual cautery at a vivid red heat.

FIG. 4.

Mode of passing the eyed probed needle preparatory to withdrawing it threaded with metallic thread; the peritoneum is included in the suture.

FIG. 5.

Aspect of the closed wound, with the variation of securing the pedicle in a permanent clamp. The removable handles are dislocated and withdrawn, and the clamp left with the pedicle firmly held in it, at the lower angle of the wound (Wells).

Controversies over the modes of treating the pedicle, or the adhesion connections of the tumor, appear to have settled down into the exclusive adoption of three—the clamp, the cautery, and ligature, the latter being left in the abdominal cavity. Some adhesions almost replace the pedicle in regard to the source of vascular supply to the tumor.

Gastrotomy, in itself of easy execution, is a mere preliminary to surgical proceedings of the gravest character. The surgeon may have to deal with one or many of the pathological conditions above mentioned (Pl. XIII.). No description in detail could comprehend all possible varieties and complications—adhesions, for example—associated with the formation and growth of neoplasms of the female productive organs; it is scarcely too much to say that the operator may have to face, and that too, unexpectedly, any variety and complication his imagination could suggest. For the purposes of diagnosis all that has been written is useless; nor will mere written instruction nor instruments specially devised bring success to the inexperienced. The former must depend on the rational employment of the method of exclusion, and even then is never free from uncertainty; as to special instruments, gastrotomists of leading renown do not use the same instruments nor surmount in the same way the same difficulties.

Patients after gastrotomy (ovariotomy), for instance, are liable to traumatism and constitutional reactions in the most aggravated forms; though of high importance, it is often not so much by surgical manipulation as by the mode of conducting the after-treatment that modern ovariotomy has taken the very first rank amongst the most successful of capital operations. Ovariotomy was rescued from disgrace by bringing to bear upon it the principles of sound surgery and varying their application according to the case. It was thus Mr. Wells commenced at once his long and distinguished career, and it is chiefly in this direction that the later literature of the subject is instructive. Nevertheless, it is doubtful whether ovarian surgery in the comprehensive sense—presenting, as it does, so many special peculiarities—should be undertaken by any one who is not a surgeon in every sense of the word without previously undergoing a sort of apprenticeship—perhaps not even then. In dealing with his first case even the well-practised surgeon will find his hand greatly strengthened by some such preparation.

The after-treatment is that which not unfrequently turns the scale, and this can only be learned by taking a prolonged and active part in it. The mere looker-on at an ovarian operation departs about as wise as when he came.

The surgical anatomy of the subject has already been given. Pathological Histology (Pl. XIV.) forms no part of the subject; the tumor is killing by reason of its volume, and for that reason alone the surgeon is called upon to remove it by gastrotomy. The balance of success is decidedly against the removal of abdominal tumors causing little or no in-

convenience. The comparative immunity from peritoneal complications after the removal of ovarian tumors causing great abdominal distention is unexplained.

Neither plates, books, nor written rules will supply the want of judgment and experience (or special aptitude it may be) on the part of the surgeon having to do with an operation whereby the life of the patient is put in extreme peril by the very first incision.

Fig. 1.

Fig. 2.

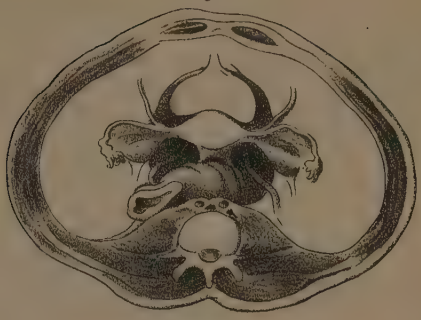

Fig. 3.

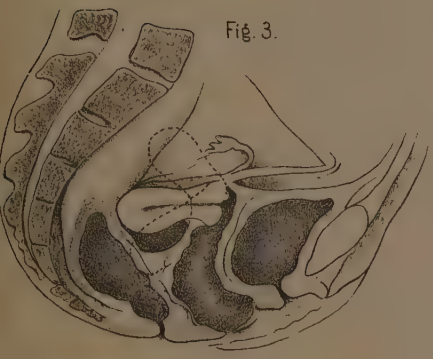

Fig. 4.

Fig. 5.

Fig. 6.

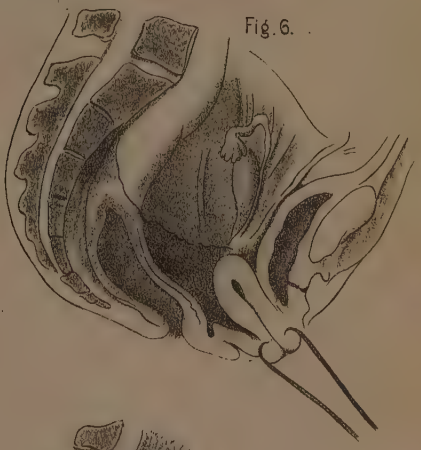

Fig. 7.

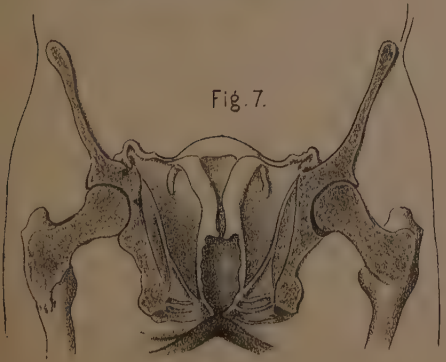

Fig. 8.

PLATE XXIX.

Diagrams representing various positions of the non-prolapsed uterus, and the relations of the pelvic organs resulting from a uterine prolapsus artificially induced.

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

PLATE XXX.

FIG. 1.

Prolapse of the anterior wall of the vagina; elongation of the uterine cervix.

FIG. 2.

Vagino-cystocele; uterus in place; slight descent of vesico-uterine peritoneal cul-de-sac.

FIG. 3.

Slight prolapse of the anterior and posterior walls at lower half of vagina; commencing cystocele and rectocele; uterus and its peritoneal relations slightly disturbed.

FIG. 4.

Prolapse of the upper half of the posterior wall of vagina; descent of the fold of Douglas; slight descent of vesico-uterine peritoneal fold.

FIG. 5

Commencing rectocele; slight descent of vagino-uterine peritoneal fold.

FIG. 6.

Vagino-rectocele; prolapse of rectum; corresponding descent of the fold of Douglas and peritoneum adjoining.

Fig. 1.

Fig. 2.

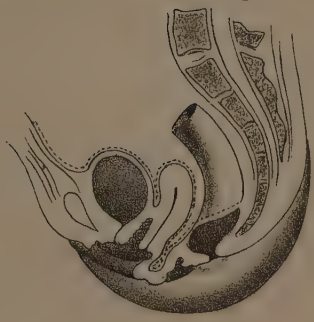

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

PLATE XXXI.

FIG. 1.

Vagino-cystocele ; descent of uterus ; corresponding descent of peritoneum.

FIG. 2.

Advanced prolapse of uterus with that of the fold of Douglas.

FIG. 3.

Advanced prolapse of uterus and fold of Douglas; rectocele.

FIG. 4.

Prolapse of the posterior wall of vagina ; descent of an enlarged uterus.

FIG. 5.

Incomplete prolapse of uterus bringing down the bladder, and antero- and retro-uterine peritoneal folds; the former below the os uteri.

FIG. 6.

Incomplete uterine prolapse; elongation, hypertrophic, of the cervix; post-vaginal prolapsus; descent of fold of Douglas; ovarian tumor.

PLATE XXXII.

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

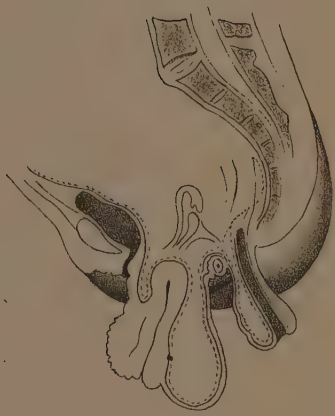

Fig. 5.

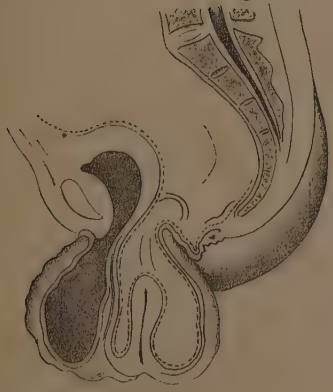

Fig. 6.

PLATE XXXII.

FIG. 1.

Incomplete uterine prolapse; elongation, hypertrophic, of cervic; post-vaginal prolapse, prolapsus ani, with descent of rectum; corresponding disturbance of the relations of bladder and peritoneum.

FIG. 2.

Incomplete uterine prolapse; enormous hypertrophic elongation of cervix, and extreme vesical cystocele.

FIG. 3.

The same as No 2, elongation less pronounced; great descent of the fold of Douglas.

FIG. 4.

Complete prolapse of the uterus; Vaginal hernia of the rectum; bladder not displaced.

FIG. 5.

Complete prolapse of the uterus; atrophic sessile uterus; corresponding displacements of bladder and peritoneum.

FIG. 6.

Complete prolapse of antiflex-uterus, the bladder bent over, but left behind; descent of anterior wall of rectum, forming a pouch; occasionally contain hard fæcal matter.

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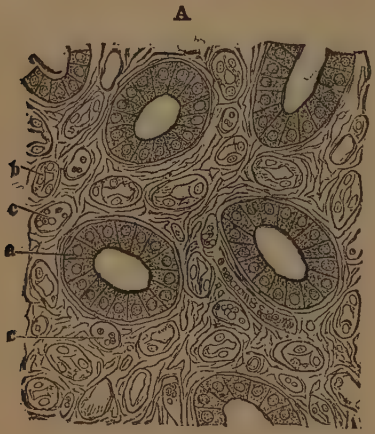

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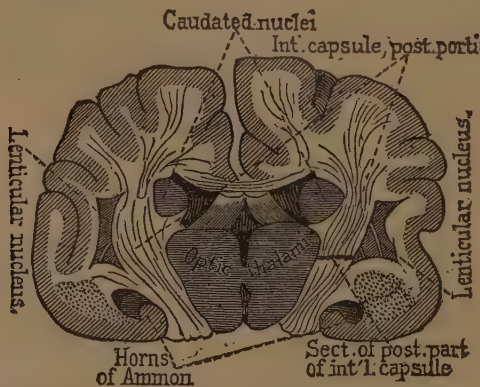

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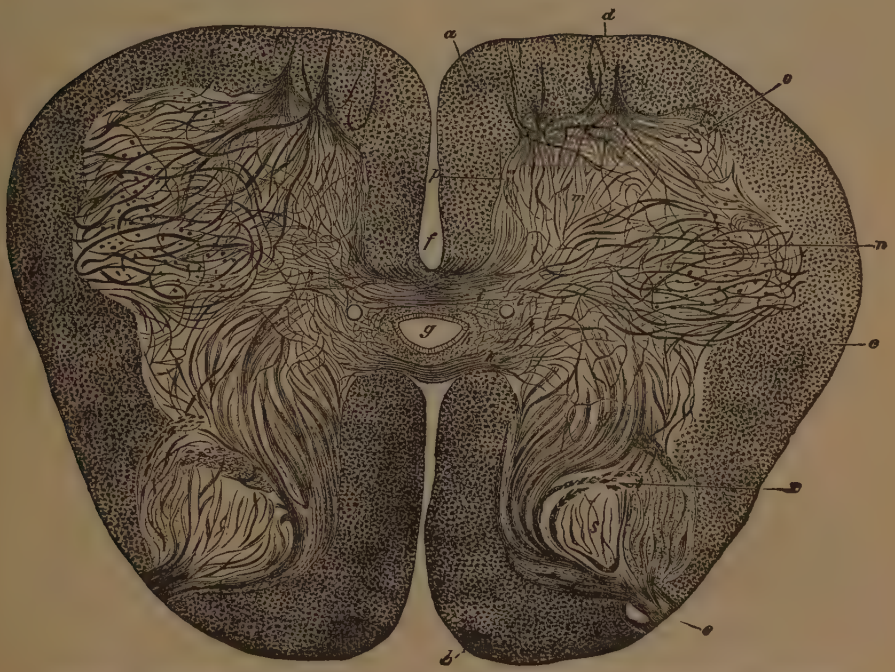

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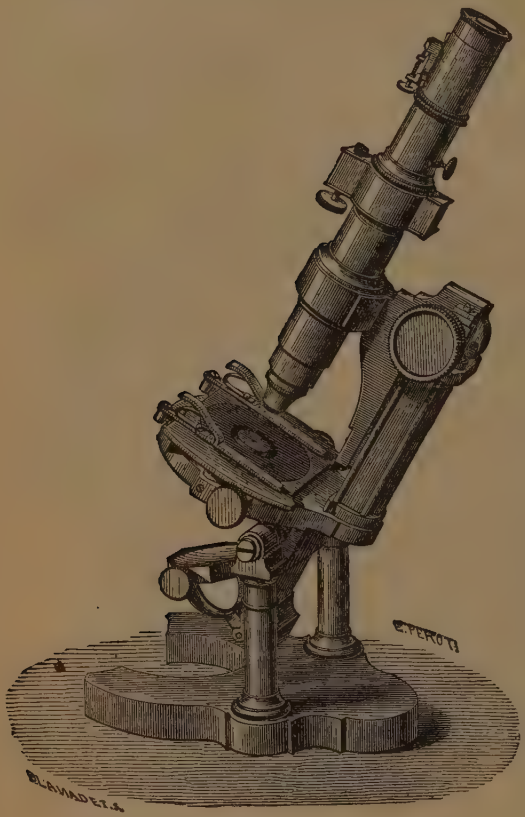

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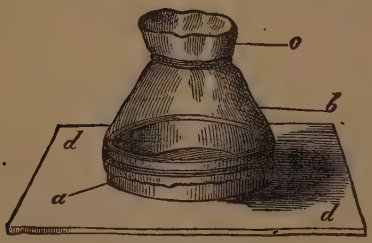

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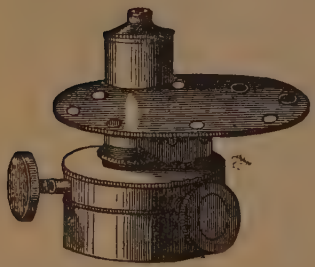

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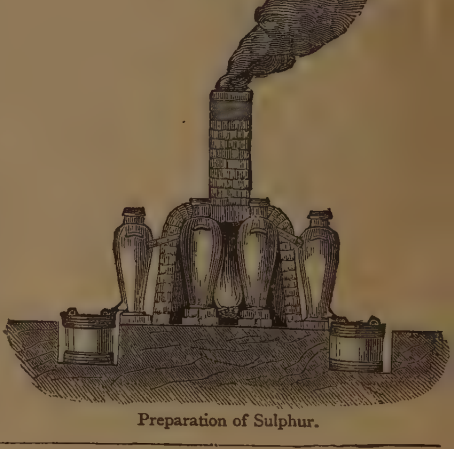

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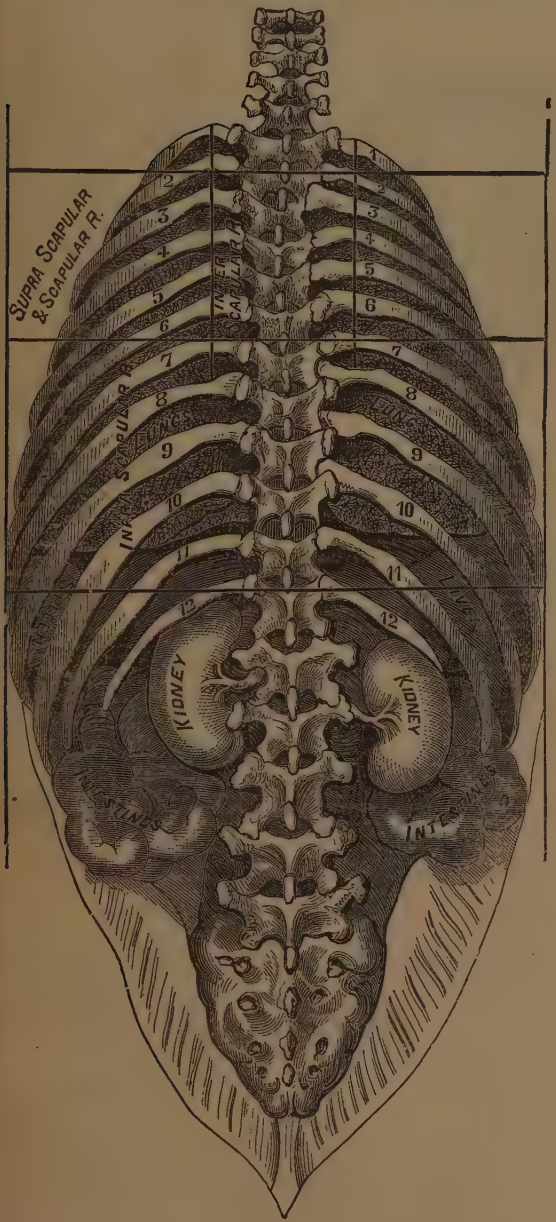

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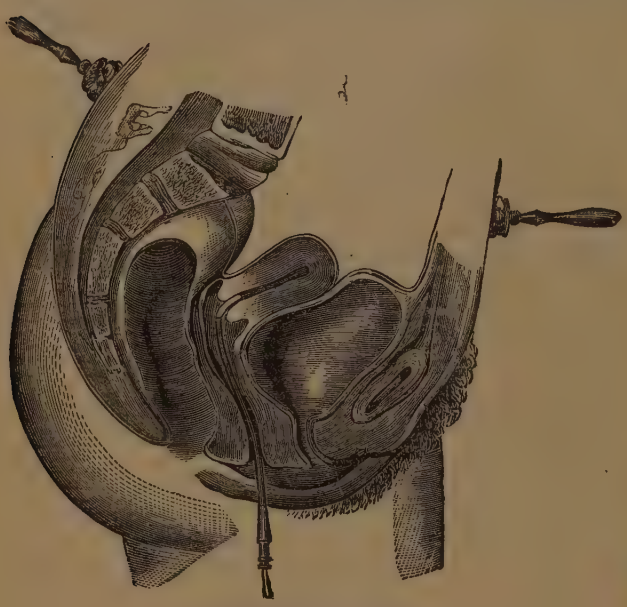

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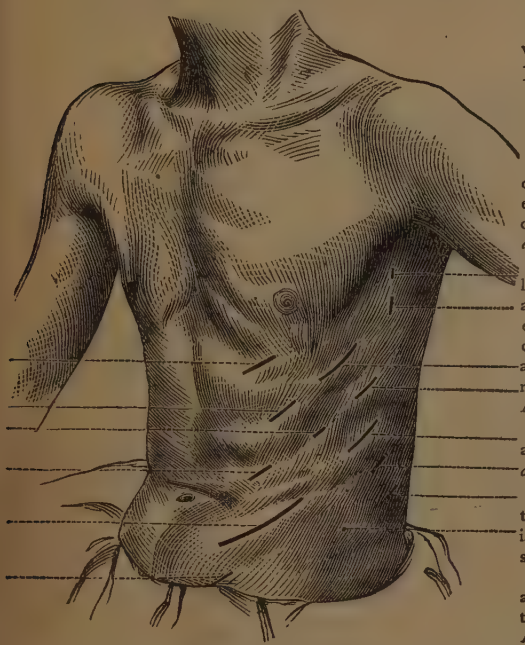

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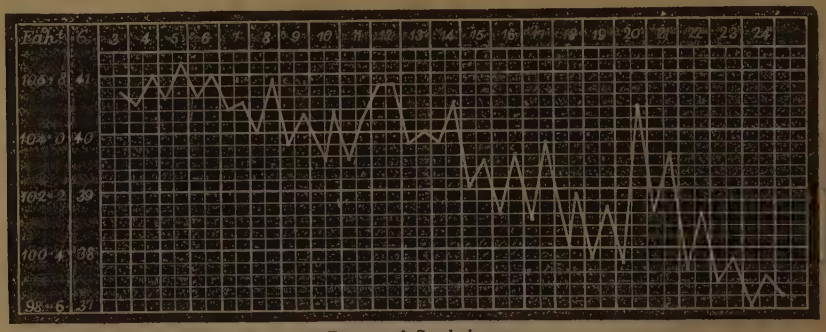

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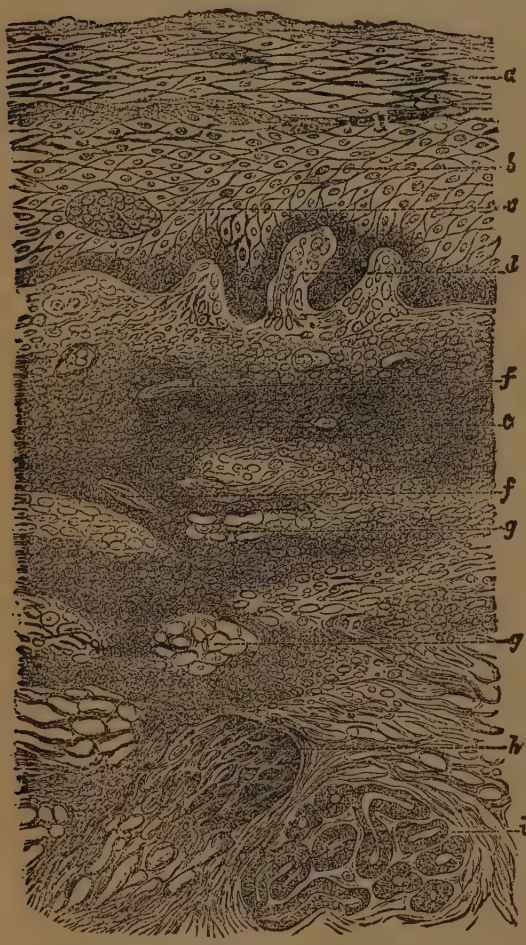

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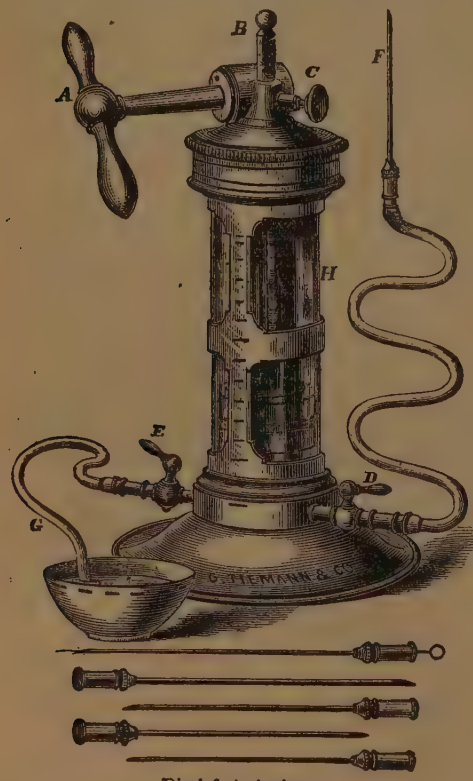

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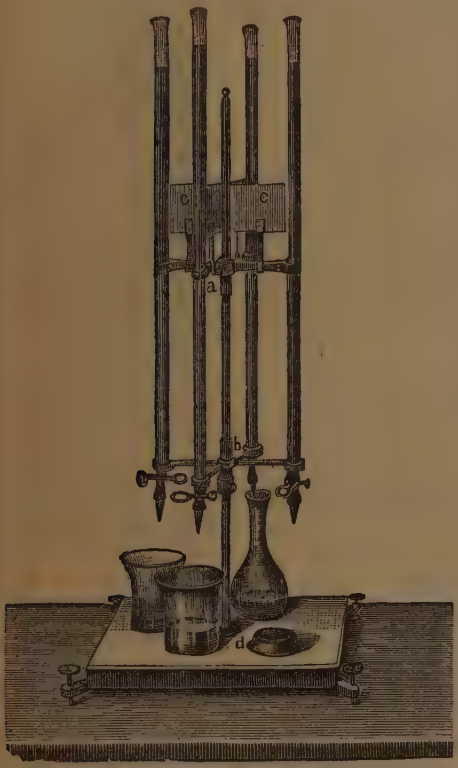

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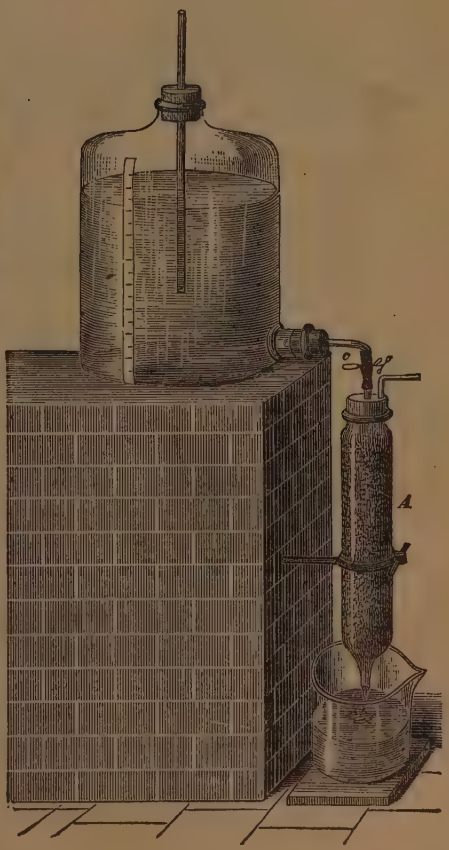

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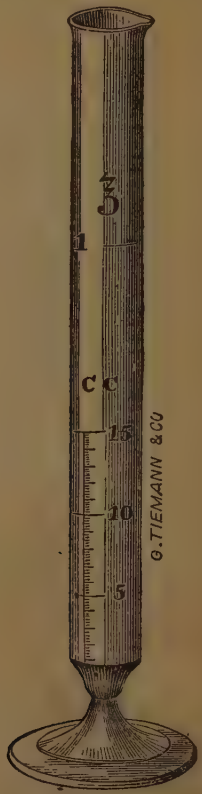

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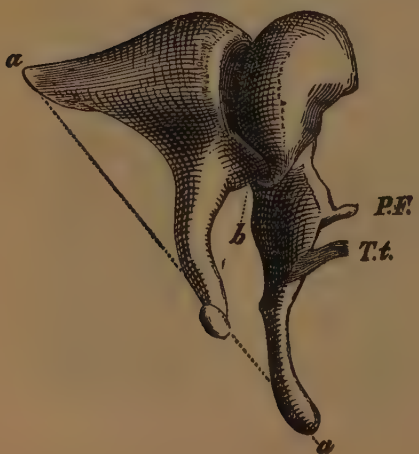

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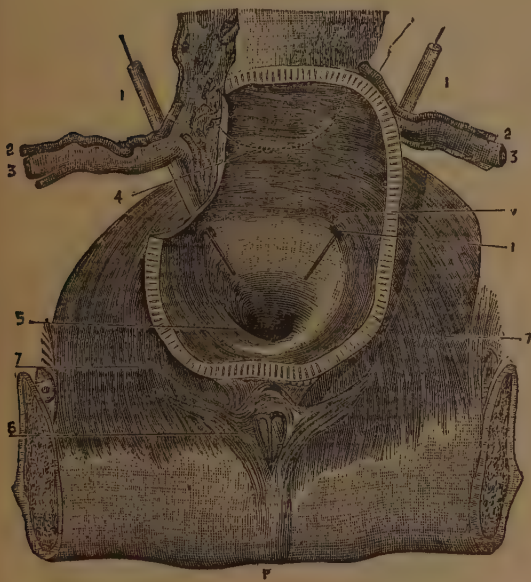

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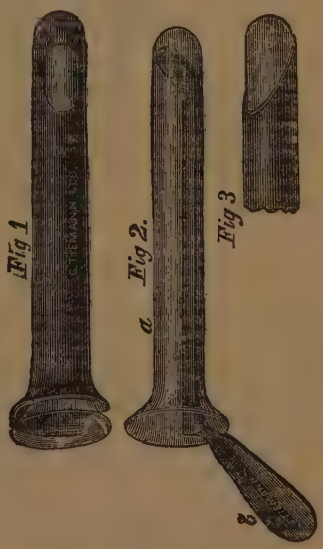

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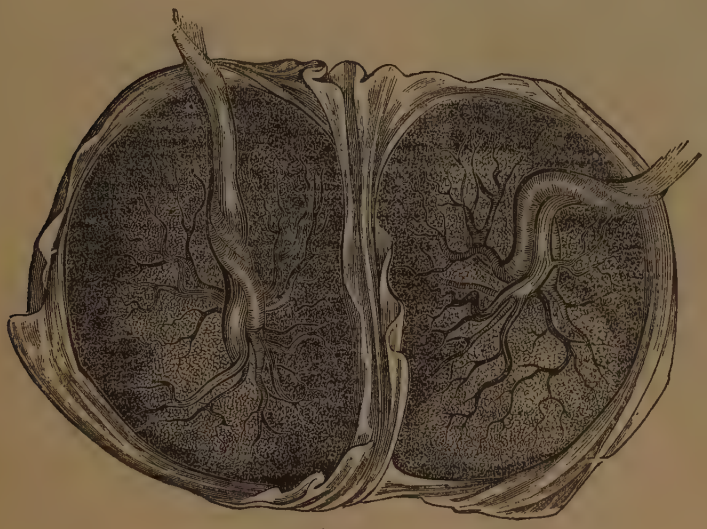

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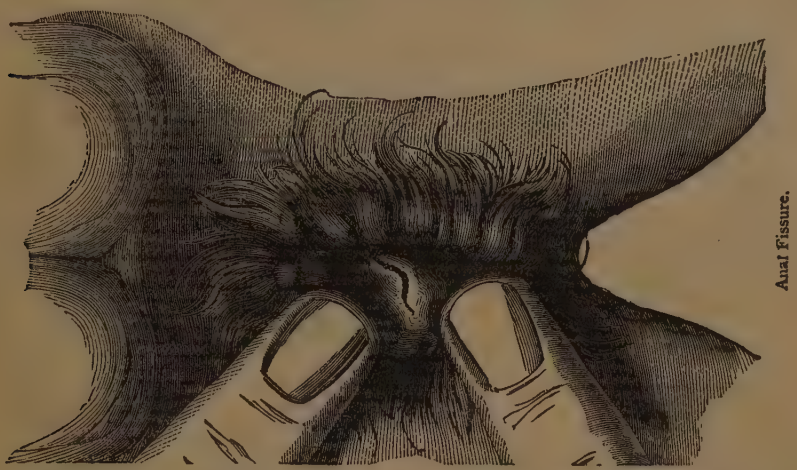

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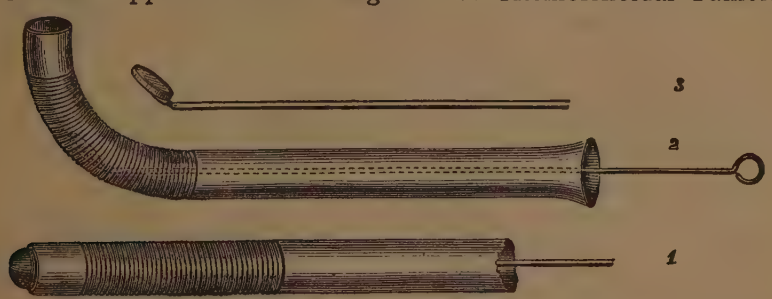

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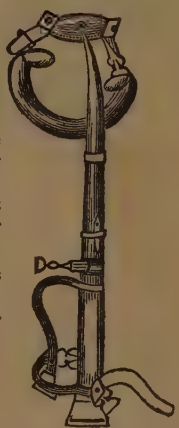

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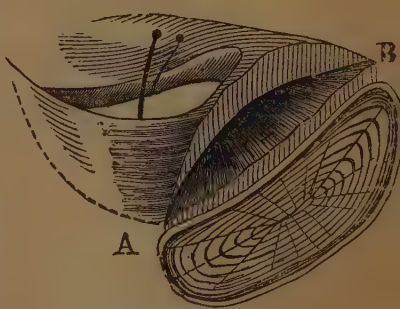

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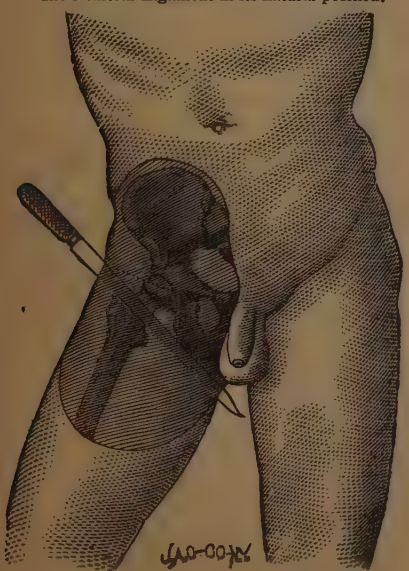

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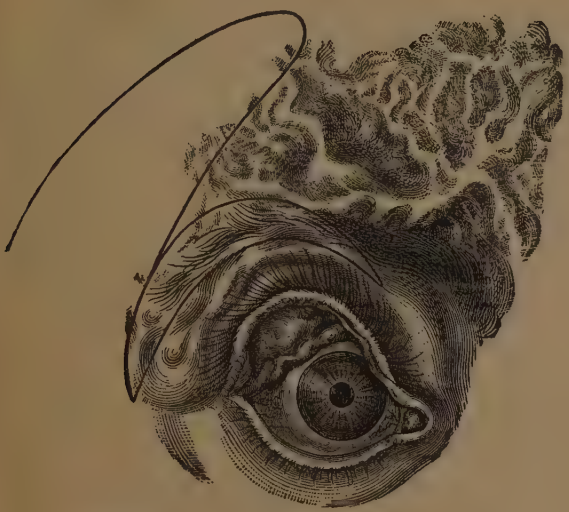

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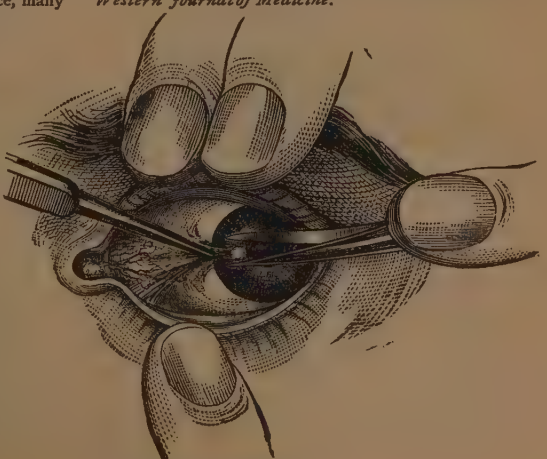

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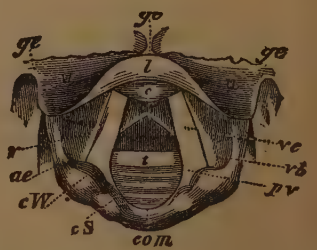

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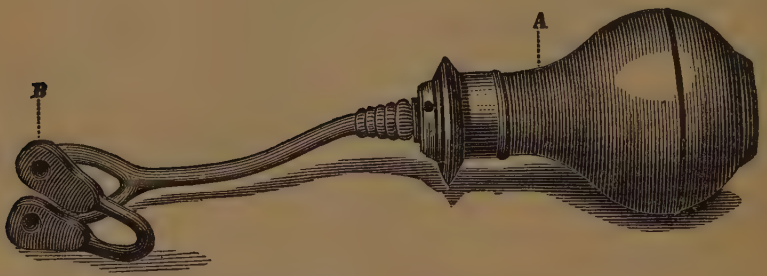

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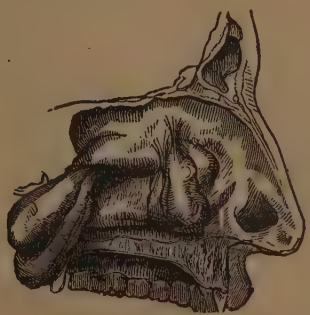

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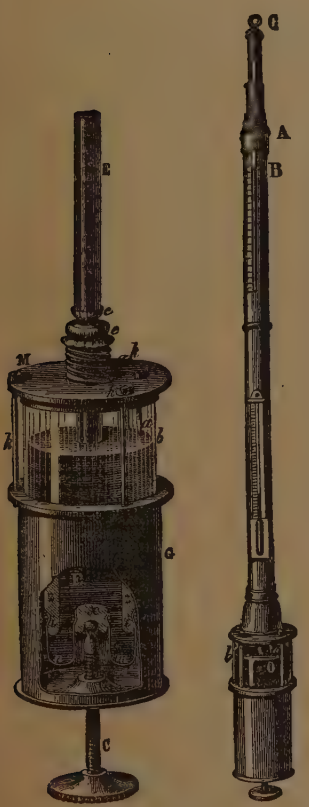

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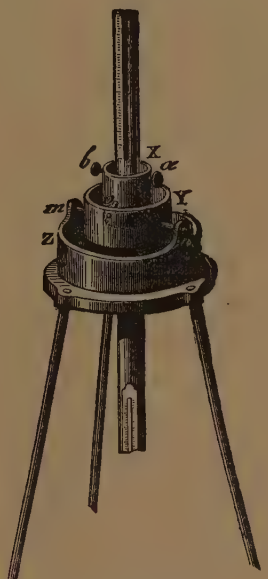

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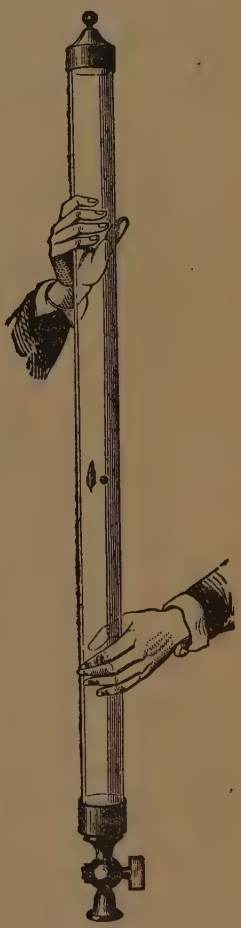

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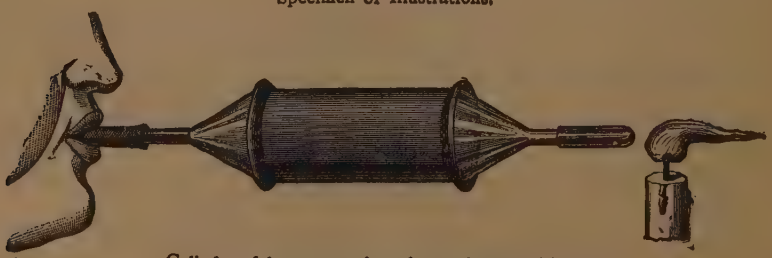

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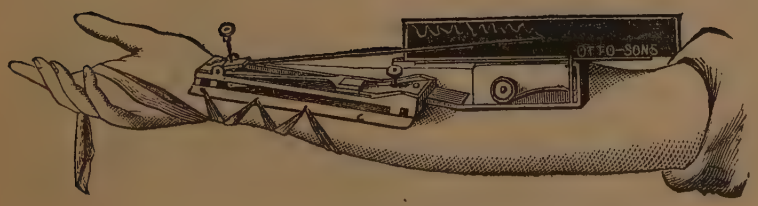

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less superficially, and is designated as the *nucleus of the glossopharyngeus* (Fig. 26, *h*). The roots of the glossopharyngeus run almost horizontally from it, outwards and forwards, making their exit from the medulla above the roots of the vagus.

Meynert and Huguenin describe further a motor nucleus of the vagus and glossopharyngeus, which is situated more in the interior, between the olivary body and ascending root of the trigeminus. We have indicated its position in Fig. 25 by *m*. Stieda looks upon it as the nucleus proper of the vagus.

The *posterior median nucleus of the acusticus* (Fig. 26) (nucleus acust. sup. of Henle; median nucleus of the posterior root of the acusticus of Krause) comes likewise into contact with the

FIG. 26.—Transverse section of the medulla through the superior end of the olivary body, where the posterior median acoustic nucleus occurs. *a*, Pyramids; *b*, olivary body; *c*, gelatinous substance and ascending trigeminus-root; *d*, corpus restiforme; *e*, funiculi cuneati et graciles; *f*, posterior median acoustic root; *g*, anterior termination of the hypoglossus nucleus; *h*, glossopharyngeus nucleus; *i*, posterior lateral acoustic nucleus; *k*, fibræ arciformes; *VIII*, posterior acoustic roots.

vagus; but it is more superficially situated, and somewhat to the outer side of the glossopharyngeal. It occupies the whole space included between the ala cinerea and pedunculus cerebelli, up to the anterior border of the striæ medullares. The posterior root of the acoustic takes its chief origin from this nucleus, and passes out partly in superficial fasciculi (striæ acusticæ), and partly through the body of the medulla. Between these two fasciculi we find the *posterior lateral acoustic nucleus* (Fig. 26, *i*) (nucleus acust. inferior of Henle) lying beside the peduncle, in the form of a small gray nodule. Besides these, the acoustic possesses two other nuclei, belonging to its anterior roots, and

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